7 RISK ASSESSMENT

7.1 RISK ASSESSMENT

The environmental issues relevant to the proposal were reviewed in light of potential impacts, site values and planning requirements. Key issues were identified based on potential impact and risk, considering the nature of potential impacts, the likelihood of impact and the sensitivity of the local environment. The risk assessment approach is consistent with AS/NZ ISO 14004:2004 (Environmental Management Systems) and AS/NZ ISO 13000:2009 (Risk Management).

The risk rating is a factor of the *likelihood* of the impact occurring and the *consequence* of the impact. Depending on the combination of consequence and likelihood values, potential overall risk ratings range from low to extreme (refer Table 7-1). High to extreme risks (termed 'key risks') warrant a higher level of investigation in the EIS. Low to medium risks are addressed in less detail. Where uncertainty exists, a higher rating has been applied.

Table 7-1 Risk assessment rating matrix

Likelihood	Consequence				
	Negligible	**Minor**	**Moderate**	**Major**	**Catastrophic**
Remote	Low	Low	Low	Medium	Medium
Unlikely	Low	Low	Medium	High	High
Possible	Low	Medium	High	Very High	Very High
Likely	Medium	High	Very High	Very High	Extreme
Almost certain/ inevitable	Medium	High	Very High	Extreme	Extreme

Table 7-2 summarises the results of the risk assessment applied to the proposal. Fourteen environmental issues were investigated. The risk rating is unmitigated, based on a 'worst case scenario' prior to assessment and development of avoidance or mitigation measures. A mitigated risk rating has also been provided and takes into account the results of the assessment and development of avoidance or mitigation measures.

Table 7-2 Risk assessment of environmental issues

Environmental risk	Likelihood	Consequence	Unmitigated Risk rating	Mitigated Risk rating
Biodiversity	Likely	Minor	High	Low
Aboriginal heritage	Possible	Moderate	High	Low
Visual and landscape	Possible	Moderate	High	Low
Land use and resources	Likely	Minor	High	Low
Soils and landforms	Possible	Minor	Medium	Low
Hydrology and water quality	Likely	Minor	High	Low
Noise and vibration	Possible	Minor	Medium	Low
Social and economic impacts	Possible	Minor	Medium	Low

Environmental risk	Likelihood	Consequence	Unmitigated Risk rating	Mitigated Risk rating
Traffic, transport and road safety	Unlikely	Moderate	Medium	Low
Hazards	Possible	Minor	Medium	Low
Historic heritage	Unlikely	Moderate	Medium	Low
Air quality and climate	Possible	Minor	Medium	Low
Waste	Possible	Minor	Medium	Low
Cumulative impacts	Almost certain	Minor	High	Low

7.2 KEY ISSUES

The risk assessment indicates four key environmental issues for the purposes of the impact assessment:

- biodiversity
- Aboriginal heritage
- visual amenity and landscape character
- Hydrology, including flooding

8 ASSESSMENT OF KEY ISSUES

8.1 BIODIVERSITY

8.1.1 Approach

A Biodiversity Assessment was prepared, in the summers of 2014 and 2015 for the CSP proposal, to assess the potential impacts of the proposal on biodiversity, flora and fauna. Given the PV Project is proposed in the same location, the survey results and assessment are still relevant for the current PV Plant design. The full report is appended in Appendix E, and summarised below.

The scope and aims of the biodiversity assessment are to:

- Determine the biodiversity values of the Study Area including identifying protected and threatened flora and fauna species, populations and ecological communities and their habitats.
- Identify the ecological constraints of the proposal.
- Identify the potential impacts of the proposal on threatened flora and fauna species, populations, ecological communities and critical habitat.
- Address the requirements of the relevant legislation including the EP&A Act, the TSC Act and the EPBC Act.
- Assess the significance of the impact of the proposal on species, ecological communities and populations listed under the TSC Act and EPBC Act.
- Propose environmental management measures to minimise, mitigate and if necessary offset residual impacts.

8.1.2 Methods

The method of assessment included:

- Database searches and literature review.
- Targeted flora and fauna field survey.
- Characterisation of impacts, with reference to specialist input (regarding operational bird risks).
- Development of mitigation measures to avoid, minimise and offset impacts of the proposal.

The field surveys were undertaken between 17 and 21 November 2014. The entire Study Area was traversed by two terrestrial ecologists, and inspected by car when able. Flora surveys where undertaken using random meanders (after Cropper 1993) and BioMetric Vegetation Plots (as per OEH 2014), and fauna surveys included point bird surveys, call playback surveys, spotlight transects, Anabat recordings, hollow-bearing tree surveys and habitat assessments. Opportunistic findings were recorded.

Additionally, bird surveys were developed in consultation with specialist ornithologist Dr Stephen Ambrose. Bird surveys were undertaken at 32 sites throughout the Study Area. In the Proposal Site, bird point survey sites were approximately 400 m apart. In the surrounding Study Area, bird survey sites were located to a distance of approximately 1000 m away from the Proposal Site.

Full details of survey effort and assessment personnel are included in Appendix E.

8.1.3 Results

Vegetation

Three native vegetation communities were observed during the surveys (not all would be impacted by the proposed development):

- Western Grey Box – Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregions.
- Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt).
- River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW.

Western Grey Box – Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregions is classified as an Endangered Ecological Community (EEC) under the NSW TSC Act and the Commonwealth EPBC Act.

Flora

Of the 54 species of plants recorded during the surveys, 17 (31%) were not indigenous to the region. One species (African Boxthorn) is declared as a Noxious Weed by Forbes Shire Council.

Database searches for threatened flora species revealed the potential for 16 species to occur within the Study Area. No threatened flora species were detected during any of the surveys. A risk based assessment, with reference to habitat attributes, considered it unlikely that any threatened flora species occur within the Study Area.

Fauna

Eighty-four fauna species were detected during the field survey including 59 bird, three reptiles, 16 bat and six other mammal species. No amphibians species were recorded.

Database searches for threatened species listed under the NSW TSC Act identified 46 bird species, three reptile, two amphibian, and 13 mammal species with the potential to occur. The EPBC Act protected matters search tool revealed six bird, one reptile, two mammal, three fish, and 10 migratory bird species with the potential to occur.

Five threatened bird species were recorded during field surveys; the Superb Parrot (*Polytelis swainsonii)*, Grey-crowned Babbler *(Pomatostomus temporalis temporalis)*, Spotted Harrier (*Circus assimilis*), Brown Treecreeper (Eastern Sub-species) (*Climacteris picumnus victoriae*) and the Turquoise Parrot (*Neophema pulchella*). One of these species, the Grey-crowned Babbler was not recorded within the Proposal Site but is considered likely to occur there occasionally. Four threatened microbats are considered to potentially occur in the Study Area based on possible to probable identifications from Anabat recordings. These are the Little Pied Bat (*Chalinolobus picatus*), Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), Inland Forest Bat (*Vespadelus baverstocki*) and Corben's Long-eared Bat (*Nyctophilus corbeni*). No threatened reptiles or amphibians were recorded.

The periodically inundated floodplains do, however, provide a marginal habitat for Sloane's Froglet, which is known from this habitat type even in disturbed environments (Sloane's Froglet Profile, NSW OEH). Despite this, the lack of records from the locality, the highly degraded habitats, and the marginally suitable habitat only occurring outside the Proposal Site means that it is unlikely that this species would be occurring within the Proposal Site.

A risk based assessment, with reference to habitat attributes, considered 45 species have a moderate or higher likelihood of occurring within the Proposal Site.

Table 8-1 Summary of threatened migratory fauna species with the potential to occur within the Proposal Site.

Species	Status *	Likelihood of occurrence
Magpie Goose	TSC-V	Moderate
Regent Honeyeater	TSC-CE, EPBC-E	Moderate
Fork-tailed Swift	EPBC-Migratory	High
Eastern Great Egret	EPBC-Marine, Migratory	Moderate
Cattle Egret	EPBC-Marine, Migratory	High
Common Sandpiper	EPBC-Marine, Migratory	Moderate
Sharp-tailed Sandpiper	EPBC-Marine, Migratory	Moderate
Pectoral Sandpiper	EPBC-Marine, Migratory	Moderate
Red-necked Stint	EPBC-Marine, Migratory	Moderate
White-throated Needletail	EPBC-Migratory	Moderate
Rainbow Bee-eater	EPBC-Migratory	Moderate
Glossy Ibis	EPBC-Migratory	Moderate
Common Greenshank	EPBC-Marine, Migratory	Moderate
Marsh Sandpiper	EPBC-Marine, Migratory	Moderate
Australasian Bittern	TSC-E, EPBC-E	Moderate
Bush Stone-curlew	TSC-E	Moderate
Curlew Sandpiper	TSC-V	Moderate
Pied Honeyeater	TSC-V	Moderate
Speckled Warbler	TSC-V	Moderate
Spotted Harrier	TSC-V	Recorded
Brown Treecreeper	TSC-V	Recorded
Varied Sittella	TSC-V	Moderate
White-fronted Chat	TSC-V	Moderate
Latham's Snipe	EPBC-Marine, Migratory	Moderate
Little Lorikeet	TSC-V	Moderate
Painted Honeyeater	TSC-V	Moderate
Brolga	TSC-V	High
Little Eagle	TSC-V	High
Swift Parrot	TSC-E, EPBC-E	Moderate
Black-tailed Godwit	TSC-V	Moderate
Hooded Robin	TSC-V	Moderate
Black-chinned Honeyeater	TSC-V	Moderate
Turquoise Parrot	TSC-V	Moderate
Barking Owl	TSC-V	Moderate

Species	Status *	Likelihood of occurrence
Blue-billed Duck	TSC-V	Moderate
Flame Robin	TSC-V	High
Superb Parrot	TSC-V, EPBC-V	Recorded
Grey-crowned Babbler	TSC-V	Recorded
Australian Painted Snipe	TSC-E, EPBC-V	Moderate
Diamond Firetail	TSC-V	High
Freckled Duck	TSC-V	Moderate
Little Pied Bat	TSC-V	Recorded
Corben's Long-eared Bat	TSC-V, EPBC-V	Recorded
Yellow-bellied Sheathtail-bat	TSC-V	Recorded
Inland Forest Bat	TSC-V	Recorded

- TSC NSW Threatened Species Conservation Act
- EPBC Commonwealth Environment Protection and Biodiversity Conservation Act
- V Vulnerable; E Endangered

Threatened fish and amphibian species were considered unlikely to be utilising the available habitat at the Proposal Site.

Critical habitat

Neither the Study Area nor the surrounding region contain any areas that have been declared as critical habitat under either the TSC Act or EPBC Act.

Wildlife connectivity corridors

The riparian zone in the Study Area is generally well-vegetated, as is the fence line running north-south along the western side of the proposed transmission line (also running north-south). Remnant patches within the Study Area generally connect to these corridors. The canopy connectivity in these zones is good, however the ground and shrub layers are poor.

The width of the riparian and road/fence corridors within the Study Area varies, but are generally no wider than 260 m. Therefore, most of the linkage vegetation is considered 'edge' vegetation and not 'core' vegetation, however it is noted that it does connect to Wilbertroy State Forest to the south-west and the riparian zone of the Lachlan River to the north-east.

Groundwater dependent ecosystems

A number of groundwater dependent ecosystems occur within the Study Area. Vegetation communities observed during the surveys that are considered likely to be dependent on groundwater resources include the River Red Gum swampy woodland wetland and possibly the Poplar Box woodland to some extent. River Red Gum woodlands are usually associated with aquatic systems including rivers, creeks, drainage lines, and floodplains whilst Poplar Box woodland is usually found in lower parts of the landscape and can be found close to floodplain areas. The River Red Gum swampy woodland wetland species would rely on water inundations from time to time.

8.1.4 Potential impacts

Construction

Potential construction impacts include loss of native vegetation and the potential for follow on impacts to:

- Weed, pests and pathogens.
- Fauna habitat, including hollow bearing trees and potential koala habitat.
- Wildlife connectivity and habitat fragmentation.
- Local hydrology.
- Fauna (injury and mortality).
- Threatened species.

Loss of Vegetation

Approximately 0.84 ha of moderate to good condition native vegetation would be permanently removed as a result of the proposal, which accounts for a small amount of such vegetation in the Study Area. The two vegetation types that would be impacted include Poplar Box Woodland and River Red Gum swampy woodland wetland. Neither of these communities are threatened under the TSC Act or EPBC Act. The remainder of vegetation to be impacted is exotic crop species with scattered native grasses and forbs which do not constitute a native plant community type (PCT).

During the design phase, an 'avoid and minimise' approach to loss of native vegetation was adopted. All remnant patches of woodland within the solar station Proposal Site have been avoided for clearing and most of the remnant woodland along the proposed transmission line was also avoided by designing the transmission line to be constructed around these patches. Only minor areas of woodland could not be avoided for clearing.

One TSC Act listed vegetation community (Inland Grey Box Woodland) was recorded adjacent to the indicative transmission line but would not be impacted by the PV Plant.

Table 8-2 Estimated loss of communities within the Proposal Site.

Vegetation Community	Threatened Ecological Community?	BioMetric Vegetation Condition	Total in the Proposal Site and Tx Line(ha)	Extent of Vegetation loss (ha)
Western Grey Box Woodland (TSC)	Yes	Moderate to good	0	0
Poplar Box Woodland	No	Moderate to good	9.44	0.21
River Red Gum swampy woodland wetland	No	Moderate to good	0.63	0.63
Exotic	No	N/A	176.72	101.31
Native Vegetation			**10.08**	**0.84**
Total Vegetation			**187.17**	**102.15**

Weeds, pests and pathogens

Spread of African Boxthorn observed on the Proposed Site may occur during vegetation removal and movement of machinery. Appropriate measures would be put in place to ensure this weed is not spread within or out of the Proposal Site.

The construction and operation of the proposal has the potential to facilitate the dispersal of pest fauna species such as the feral European Rabbit (*Oryctolagus cuniculus*), European Red Fox (*Vulpes vulpes*), and Feral Cat (*Felis catus*). However, these species are already present within the Proposal Site and in the locality.

Several pathogens in NSW have the potential to impact on the environment and biodiversity. These may be introduced and spread during the construction of the proposal such as:

- Phytophthora (*Phytophthora cinnamomi*).
- Myrtle Rust (*Uredo rangelli*).
- Fusarium Wilt/Panama disease (*Fusarium oxysporum*).

Where risk of spread is apparent, mitigation measures should be followed to prevent their introduction or spread. Impacts due to these pathogens are unlikely.

Fauna habitat

Mature trees provide more flowers, nectar, fruit and seeds than younger trees, as well as a complex substrate that supplies diverse habitats for invertebrate populations (Recher 1996). Threatened bird species that are more likely to utilise the Proposal Site for these resources include Superb Parrots, Grey-crowned Babblers, Brown Treecreeper, Little Lorikeets, and Varied Sittellas. However, as only 0.84 ha of native woodland would be cleared due to the proposal and the majority of woodland within the Proposal Site would remain intact, these minor impacts are likely to be negligible to woodland dependent fauna species recorded or likely to occur within the Proposal Site.

The exotic crop and pasture grasses occurring within the Proposal Site can be used by native and exotic grazing herbivores, as well as reptiles and invertebrates for refuge and foraging. However, most of this ground cover would remain intact due to the proposed works. Furthermore, this habitat type is abundant throughout the Study Area, therefore the relative loss of this habitat type due to the proposal would be negligible.

Loss of Hollow-Bearing Trees

Two hundred and five hollow-bearing trees are located within or are very close to the Proposal Site. Ten of these trees within the Development Envelope will require removal for the proposed works. Fifty-nine hollows were recorded in these ten trees consisting of 47 small hollows, eight medium hollows and four large hollows. The loss of these trees represents a proportional reduction of approximately 5% of all hollow-bearing trees observed within the Proposal Site. With 195 hollow-bearing trees remaining in the Proposal Site that will not be impacted, the loss from the proposed development is considered minor. Mitigation and management measures have been proposed which include a staged habitat removal process and the development and implementation of an offset plan to minimise injury and mortality and account for the loss in habitat resources.

Koala Habitat

No scratches or scats attributable to Koalas were observed during the field surveys. There are no records of Koalas within 10 km of the Proposal Site. One primary feed tree was present within the Proposal Site being River Red Gum. Two secondary feed trees were also present within the Proposal Site, including Poplar Box and Inland Grey Box.

Most of the moderate to good condition native vegetation present within the Study Area consists of habitat considered critical to the survival of the Koala, and some of these patches consist of “potential

Koala habitat" as defined by SEPP 44. Despite this, the fragmented nature of habitat in the locality, the lack of primary feed tree species to be impacted, and the lack of local records of Koala suggest that the Proposal Site is unlikely to provide habitat that is being or will be utilised by Koalas.

Wildlife Connectivity and Habitat Fragmentation

The removal of approximately 0.84 ha of native vegetation in moderate to good condition from the Proposal Site would reduce the extent of remnant vegetation in the local landscape to a minor level. This loss of habitat would only cause minor fragmentation between the Proposal Site and the lagoon/floodplain area directly to the north, and possibly to the north-south remnant vegetation along the proposed transmission line. Species utilising the Proposal Site as a habitat corridor are likely to already be tolerant of a certain level of fragmentation and are more likely to be highly mobile, wide-ranging species. It is unlikely that connectivity structures would be a suitable mitigation measure due to limited overstorey vegetation in the surrounding landscape, and the suite of species that occur within the Study Area.

Injury and Mortality

Clearing of vegetation within the Proposal Site during construction has the potential to injure fauna due to the disturbance of habitat. Many smaller and more common species such as skinks and frogs are difficult to locate or remove during pre-clearing surveys. It is likely there will be some loss of individuals impacted during construction. There is also the potential for hidden hollows to be present in the forks of large trees, in which bats or birds may occur. Injuries or fatalities to native fauna during the clearing process may arise from such situations. Safeguards and management measures would be put in place during the construction phase to prevent and minimise such impacts.

Changed Hydrology

Impacts of changed hydrology on biodiversity include deteriorating water quality, reduced water availability, altered flow regimes in waterways, and the rising of water tables due to clearing of native vegetation and the movement of salts to surface layers of soil and waterways. Vegetation clearing would be of a minor level. Following construction, ground cover vegetation would be maintained.

Threatened species

Assessments of Significance (AoS) were conducted for species at risk of construction impacts to characterise the significance of potential impacts. Significant impacts are not considered likely as a consequence of construction. All AoS are provided in Appendix E.

Operation

Potential operational impacts that could be associated with the proposal include:

- Alteration to microclimate and erosion potential under the PV array.
- Changes in rainfall distribution on the site.
- Loss of or alteration to grassland habitat.
- Effects on fire frequency.
- Weed introduction and spread.
- Fauna injury and mortality.
- Threatened species (injuries or mortality due to collisions with infrastructure or loss or modification of habitat).

Alteration to microclimate and erosion potential

Vegetation and ground habitats would likely be affected by reduced insolation and temperature and increased humidity underneath the PV modules. Wind speeds may also be reduced. In the grazed paddocks existing native and exotic pasture across the site may decline initially due to shading following installation of the PV modules. Areas of exotic pasture are of little importance in terms of biodiversity; however, a reduction in cover may lead to bare ground and susceptibility of the soil to erosion. The selection of a more suitable shade tolerant pasture species for planting would address this issue. It is likely that a native groundcover would survive onsite under the PV modules in areas where a native groundcover currently exists.

Soil underneath the PV modules would likely receive less rainfall than surrounding soil. However, as these would be moved to a near horizontal angle at night, combined with reduce evapotranspiration losses due to shading and reduced air movement. Lateral movement of surface and subsurface water from adjacent rain-exposed areas would be likely to occur. As such, the net amount of moisture available to vegetation under the PV modules is unlikely to be reduced. Where higher rates are achieved, higher growth rate of groundcover may occur, reducing effects of shading that are discussed above.

There could be a concentration of rainfall runoff in a strip below the lower edge of the PV modules. This could increase rain-splash intensity and soil erosion potential in this area during heavy rainfall events. The erosion risks should be manageable using adequate site preparation, and responsive pasture and stock management.

Loss of or alteration to grassland habitat

As the PV modules would be located in modified grazing and cropping paddocks with few fauna habitat values, there is a low probability of fauna species, particularly threatened species, being impacted by any microclimate and associated vegetation changes that may occur in these areas.

Weeds

Rehabilitation of disturbed areas and post-construction weed management would limit the establishment and spread of weed species during construction and operation of the proposed road alignment.

Injury and Mortality

The main operational impacts resulting from operation of the solar station relate to:

- Collision risks with infrastructure including PV modules, cables and perimeter barbed wire fencing.
- PV modules and reflected light perceived by birds as wetlands.
- Attraction of birds to bright lights at night.
- Attraction of birds to insects culls.
- Stranding and predation of birds.

These effects would be increased where flocking or amalgamations of birds occur, potentially attracted to the site by infrastructure (perching opportunities), the nearby lagoon (when inundated) or if large numbers of prey species (moths) were found to be accumulating at the site. This underscores the importance of monitoring any injuries and adaptively managing unacceptable levels of impact.

The assessment considered:

- The numbers of bird mortalities and injuries at facilities using PV technology is relatively small compared with other anthropomorphic impacts.

- The proposed management of the plant could be used to reduce impacts.

The assessment has identified that it is unlikely that the proposal would significantly impact local populations of bird species, including threatened species and listed migratory species. Mitigation measures have been developed to assist in reducing impact to bird species.

Threatened species

AoS were conducted for species at risk of operational impacts to characterise the significance of potential impacts. Significant impacts are not considered likely as a consequence of operation. This conclusion is contingent upon monitoring and a program of adaptive management regarding injuries that result to birds onsite.

8.1.5 Mitigation measures

Measures to avoid and minimise impacts associated with the proposed works include:

- Clear zone reductions in areas where vegetation is of conservation significance. Discussions with the proponent regarding the presence of EEC and hollow-bearing trees have resulted in a proposed transmission line design that avoids clearing of remnant patches of woodland, however some trees on edges may still be cleared due to the proposal. The remnant patches of Poplar Box Woodland within the Proposal Site will not be cleared as a result of the proposal.
- The proposal has been sited and designed to avoid or minimise the clearing of hollow-bearing trees. Only ten hollow-bearing trees of a possible 205 in the Study Area would be cleared.

'A Biodiversity Offset Strategy (BOS) will be developed and implemented as part of the approval of the proposal. The BOS will provide a framework for determining the number and type of ecosystem and species credits required to offset residual impacts of the activity on biodiversity ('credit obligation') in accordance with the Biodiversity Offsets Scheme. The objective of the proposed offsetting would be to ensure that an overall 'maintain or improve' outcome is met for the project; where impacts cannot be avoided, or sufficiently minimised, the residual impact would be offset in perpetuity.

Loss of native vegetation is expected to be minimal in the project site itself, as the PV project is such that vegetation removal can be kept to a minimum across the area of the solar array (the largest part of the development). There is expected to be approximately 0.64 ha loss of vegetation, that includes approximately ten hollow-bearing trees, in the easement for the transmission line and solar arrays. The BOS will set out to determine the extent of vegetation required to be offset for the purpose of the development and proved certainty that a suitable number of offsets are available for the unavoidable impacts. The extent of offset will include non-EEC vegetation, and known threatened fauna species habitat, avoided and retained within the broader lot boundary. This offset will be managed to ensure that threatened species habitats continue to exist within the site, and are enhanced in the future.

It is proposed that an offset will be established subject to consent conditions within 2 years of the commencement of construction. The retirement of these credits must be carried out in accordance with the NSW Biodiversity Offsets Scheme, and will be achieved by:

a) acquiring or retiring credits under the Biodiversity Conservation Act 2016;
b) making payments into the Biodiversity Conservation Fund that has been established by the NSW Government.'

The following management and mitigation strategies are recommended to manage biodiversity impacts associated with the development.

Table 8-3 Safeguards and mitigation measures for biodiversity

Safeguards and mitigation measures	Phase
Clearing impacts would be minimised by: • A CEMP would be prepared including an erosion sediment control plan, vegetation management measures, a revegetation and weed management program, fauna management measures, and Work Methods Statements for all works within 10 m of the waterways occurring adjacent to the Proposal Site. All site workers should be inducted and made aware of the conservation issues and associated CEMP for the site. • Prior to the commencement of work, the clearing limit needs to be clearly demarcated and implemented. The delineation of such a boundary may include the use of temporary fencing, flagging tape, parawebbing or similar. • Pre-clearing surveys would be carried out by an ecologist and would include targeted surveys for nesting Superb Parrots, Grey-crowned Babblers, Brown Treecreepers and general tree hollow inspections where possible. They would include targeted searches for arboreal fauna and inspections of vegetation for other fauna occupancy. Habitat trees would be clearly marked with flagging tape. If active nests are found during clearing works, or hollows are being used by nesting birds or arboreal mammals, an ecologist or local wildlife carer should be contacted to remove the eggs, chicks or juvenile mammals to be hand-raised. • Trees would be removed in such a way as not to cause damage to surrounding vegetation. Root systems of trees and shrubs to be removed should be retained in-ground to ensure surrounding ground layer vegetation is undisturbed and to prevent soil erosion. • Where possible, trees to be removed would be mulched on-site and re-used to stabilise disturbed areas. • Where trees are to be retained, an adequate tree protection zone (TPZ) should be provided around each tree for the duration of construction. Details for calculating TPZs are provided within *Australian Standard 4970-2009 – Protection of trees on development sites*. • If work cannot avoid encroaching into the TPZ, it would not impinge on the structural root zones (SRZ) of trees to be retained. Details for calculating the SRZs are provided within *Australian Standard 4970-2009 – Protection of trees on development sites*. • An unexpected threatened species finds procedure would be developed before clearing is begun.	Construction
Hollow bearing tree impacts would be minimised by: • Staged habitat removal for the removal of hollow-bearing trees would be undertaken where non-habitat vegetation would be cleared initially following a pre-clearing inspection by a qualified ecologist. Habitat trees would be disturbed by 'knocking' at this time and cleared at least 24 hours after. • Clearing of hollow-bearing trees would not take place between September and February, where possible. If clearing during this period cannot be avoided, an ecologist would be present on site to check all hollows for animals. If a hollow is being used by a threatened species (e.g. Superb Parrot), an exclusion barrier of appropriate distance (e.g. 30 m from the base of the tree) would be installed to prevent disturbance. If a hollow is being used by a species not listed under the TSC Act or EPBC Act, any animals present will be caught and either released into	Construction

Safeguards and mitigation measures	Phase
appropriate alternative habitat or taken to a wildlife carer.	
Residual impacts would be offset: • An Offset Management Plan would be developed and implemented to offset the loss of native vegetation, including hollow-bearing trees. This may include direct offsets or other strategies to improve biodiversity outcomes commensurate with the impacts of the project on native vegetation.	Operation
To minimise impacts native vegetation outside the impact zone, stockpile and compound sites would be located using the following criteria: • Within the Proposal Site. • At least 40 m away from the nearest waterway. • In areas of low ecological conservation significance (i.e. previously disturbed land). • On relatively level ground. • Outside the 1 in 10 year Average Recurrence Interval (ARI) floodplain.	Construction
A Weed Management Plan would be developed for the sites to prevent/minimise the spread of weeds in and between sites. This would include: • Declared noxious weeds would be managed according to the requirements stipulated by the *Noxious Weeds Act 1993* during and post construction • Develop protocol for weed hygiene in relation to plant, machinery and importation and management of fill • All pesticides would be used in accordance with the requirements on the label. Any person undertaking pesticide (including herbicide) application would be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation. • Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated and reported.	Construction Operation Decommissioning
Disturbance to habitat features would be minimised by: • Any fallen timber, dead wood and bush rock (if present) encountered on site would be left in situ or relocated to a suitable place nearby. Rock would be removed with suitable machinery so as not to damage the underlying rock or result in excessive soil disturbance.	Construction
To minimise injuries to microbats and birds: • Use of barbed wire would be avoided.	Construction Operation
Implement feral animal management program, including species such as rabbits, rodents and starlings to reduce risk of attracting raptors.	Operation

8.2 ABORIGINAL HERITAGE

8.2.1 Approach and methods

The Aboriginal Cultural Heritage Assessment (ACHA) sought to identify and record Aboriginal cultural areas, objects or places, to assess the archaeological potential of the proposal site, and to formulate management recommendations based on the results of Aboriginal community consultation, background research, field survey and significance assessment.

The ACHA was conducted in accordance with the Draft Guidelines for *Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005), the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011) and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b). The general approach of the ACHA included the following steps:

- Description of the land and history of peoples living on the land.
- A review of previous archaeological work and heritage listings on the NSW OEH Aboriginal Heritage Information Management System (AHIMS).
- A predictive model of Aboriginal site distribution relevant to the proposal site.
- A field inspection.
- Aboriginal community consultation.
- An analysis of background information.
- An assessment of the impact of the proposal on Aboriginal objects and places.
- Consideration of management and mitigation measures.

Aboriginal community consultation undertaken as part of the ACHA has been conducted in accordance with the guidelines set in the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005) and OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a). Section 6 describes the Aboriginal community consultation process that took place in relation to the proposal.

A cultural heritage and archaeological survey for Aboriginal areas, objects and places was conducted over two days in December 2014 by archaeologists Julie Dibden and Tom Knight, NSW Archaeology Pty Ltd. Richard Coe, representing the Condobolin LALC, was involved in the field survey.

8.2.2 Background

The proposal site is situated within land which today is seen as having traditionally been occupied by the Wiradjuri peoples. The Wiradjuri inhabited a widespread area which extended from the Great Dividing Range west to the Macquarie, Lachlan and the Murrumbidgee rivers (Coe 1989). The area has undergone very high levels of prior disturbance associated with original land clearance and cultivation. Accordingly, the archaeological context of Aboriginal objects/sites is considered to be correspondingly disturbed, and lessens their value and significance.

Thurumbidgee Lagoon, north of the proposal site forms a part of an overflow channel which extends southwest from a bend in the Lachlan River. The land adjacent (within c. 200 m) to the lagoon is archaeologically sensitive given the presence of water and would likely have been targeted seasonally while people hunted and moved away from the main river. The lagoon would also have been targeted for the exploitation of flora and fauna, again, at least seasonally. As a result, the materials associated with this land use, such as stone artefacts, hearths and perhaps human interments, would remain present in

areas proximate to the lagoon. It is considered unlikely that these would occur in any significant density further than c. 100 - 200 m from the lagoon.

A search of the AHIMS was conducted on 29 September 2014 (AHIMS Reference: 149272) for a 400km^2 area encompassing the proposal site. Five Aboriginal object sites are listed for the search area, none of which occur in the proposal site.

Searches have also been conducted of the NSW State Heritage Inventory and the Australian Heritage database. No Aboriginal heritage sites for the area are listed in either database.

During the cultural heritage and archaeological survey, six low density stone artefact locales were recorded in the vicinity of the proposal site, which have been assessed to be of Low local scientific significance. (refer to Appendix G). Four trees with scars were also recorded, none of which were considered to be of Aboriginal origin.

8.2.3 Potential impacts

Construction

An impact assessment of Aboriginal object locales in the vicinity proposal site is shown in Figure 8-1 illustrates the proposal site in relation to the identified Aboriginal object locales.

Table 8-4 Aboriginal object locales within the proposal area

Aboriginal object site	Significance	Type of harm	Degree of harm	Consequence of harm
Jemalong Locale 1	Low local scientific significance.	nil	nil	nil
Jemalong Locale 2	Low/moderate local scientific significance.	nil	nil	nil
Jemalong Locale 3	Low local scientific significance.	nil	nil	nil
Jemalong Locale 4	Low local scientific significance.	nil	nil	nil
Jemalong Locale 5	Low local scientific significance.	nil	nil	nil
Jemalong Locale 6	Low local scientific significance.	nil	nil	nil

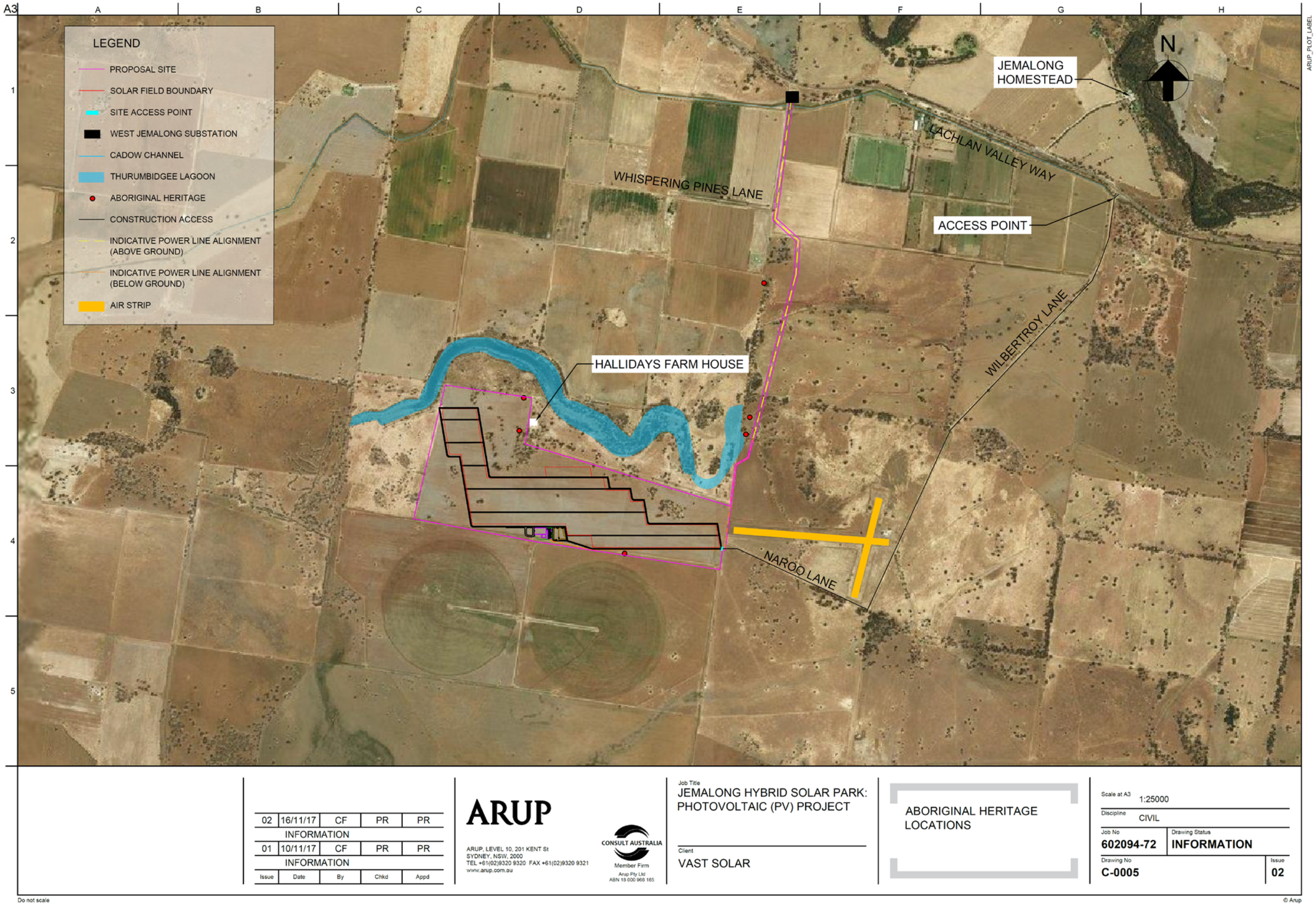

Figure 8-1 Location of Aboriginal object locales recorded during the field assessment (Source: NSW Archaeology 2014).

No Aboriginal objects or survey units with potential conservation value have been identified to have a high probability of being present and impacted by the works. No direct impact is expected within any of the Aboriginal object locales.

8.2.4 Mitigation measures

The ACHA Report proposes the following management and mitigation strategies. Most are relevant to the pre-construction design phase of the project and focus on avoidance of impacts.

Table 8-5 Mitigation measures for Aboriginal heritage impacts

Mitigation measures	Phase
A Cultural Heritage Management Plan would be prepared to guide the process for management and mitigation of impacts to Aboriginal cultural heritage. This would be undertaken in consultation with a consulting archaeologist, the registered Aboriginal parties and the NSW Office of Environment and Heritage. The 66kv HV line has been relocated eastward away from the lagoon so that the predicted sensitive area within 200m of the lagoon is avoided. Parts of the new alignment were not surveyed in 2014. Additional survey will need to be carried out during the detailed design phase.	Pre-construction
Personnel involved in the construction and management phases of the project would be trained in awareness and procedures to implement recommendations relating to cultural heritage, as necessary.	Construction
Cultural heritage would be included within any environmental audit of impacts proposed to be undertaken during the construction phase of the development.	Construction
In the unlikely event that human remains are discovered during the construction, all work must cease in the immediate vicinity. OEH, the local police and the registered Aboriginal parties should be notified. Further assessment must be undertaken to determine if the remains were Aboriginal or non-Aboriginal.	Construction
Additional archaeological assessment would be required in any areas which are proposed for impacts that have not been surveyed during the current assessment	Construction

8.3 VISUAL AMENITY AND LANDSCAPE CHARACTER

8.3.1 Approach and methods

A visual impact assessment was undertaken by Fresh Landscape Designs for the original concept of a 30MW CSP Plant on the Proposal Site (Development Application SSD_14_6588, to be amended to move the CSP Plant to a different location). As the PV Plant and associated high voltage power line easements are generally proposed in the same locality that was assessed, the results of the baseline study remain valid to this project. With regards to the discussion of the impacts, these have been reassessed, taking into consideration the changes to the proposed components and facilities used in the development of a PV system, in particular the absence of receiver towers and heliostats. An Explanatory Note for the rational of the use of the CSP's visual impact assessment and a copy of the full assessment is provided in Appendix J.

The purpose of the visual impact assessment was to identify the nature and degree of visual change that would be introduced into the landscape by the proposal, assess whether it is an adverse or beneficial change, evaluate its significance and recommend mitigation measures where appropriate.

The visual assessment consists of two components, a baseline study and a visual impact assessment. The baseline study is an inventory of the existing visual character and the ways views of the proposal may be experienced. The visual impact assessment describes the changes in visual character and visual amenity that are anticipated as a result of the development. Specifically, the elements of each component include:

- Baseline study:
    - Definition of study area
    - Desktop study including collection and review of existing literature, tourism information, maps and aerial photos, review of the description of the proposed development, identification of approximate visibility of the development based on the topography and identification of potential viewing opportunities for residents, workers, visitors and travellers
    - Field survey to validate the actual extent of visibility, identify key and representative viewpoints and construct a comprehensive photographic record
    - Visual baseline analysis including the classification of landscape character units and values for particular areas.
- Impact assessment:
    - Identification of the views likely to be affected by the proposal
    - Identification of susceptibility of viewers to change at those locations based on general principles and the results of community consultation
    - Identification of visual effects introduced by the development for key and representative viewpoints
    - Assessment of options for mitigation of adverse visual effects
    - Evaluation of the level of visual impact and its significance after mitigation.

Public consultation (as summarised in Section 6) were referenced in the preparation of the visual impact assessment.

8.3.2 Existing environment

The study area for the visual impact assessment was limited to within 16 km of the Proposal Site. The distance limit is based on the extent of the background distance zone (WAPC 2007) in relation to the Proposal Site.

The study area was divided into six landscape character units (LCUs) (similar in terms of landform, vegetation patterns, water form, land use patterns and aesthetic qualities) and their scenic quality was assessed. These are described below.

Table 8-6 Landscape character units

LCU	Visual amenity and quality
LCU1: Farmland	Considered attractive as a working rural landscape with wide, open spaces covered with pasture or crops and areas of natives. It contains some buildings of heritage interest. Views from individual houses likely to be highly valued by the occupants.
LCU2: Lachlan Valley Way corridor	Moderately attractive travel route through a typical rural working landscape.
LCU3: Lachlan River corridor	Highly valued locally as a relatively natural area used for recreation. It is an area mentioned in tourism literature and is a landmark and backdrop for surrounding areas. It is likely to have significance for traditional owners.
LCU4: Bedgerabong settlement	Likely to be valued locally as familiar rural-style landscape without distinctive scenic features. Contains areas of heritage interests. View from individual houses likely to be highly valued by the occupants.
LCU5: Jemalong Ridge	Valued locally as dramatic landform and relatively natural area. Identified as a key landscape feature for the Forbes area.
LCU6: Wilbertroy State Forest	Valued at state level for ecological values.

Viewing opportunities of the proposal development are outlined in Table 8-6.

Table 8-7 Viewing opportunities of the proposal

Location and types of viewers	Nature of views to proposal
Newell Highway – many travellers on transport route.	Fleeting views looking NNW from short section of highway approximately 16 km from the proposed solar plant and transmission line.
Lachlan Valley Way – moderate number of travellers on transport route	Short duration views looking south (perpendicular to direction of travel), closest points are approximately 3.1 km from the proposed solar plant and 150m from transmission line.
Lachlan River – moderate number of tourists and local people	Long duration views for campers, fishers and other people engaged in social and recreational activities looking south, closest points are approximately 3.3 km from the proposed solar plant and 3.3 km from transmission line.
Bedgerabong – small number of residents in and around houses and visitors travelling through locality, moderate numbers attending events	Views looking south to the proposed solar plant (closest residence 4.9 km) and transmission line (closest residence 2.1 km). Long duration views from private houses and small farms, medium duration views from community facilities, short duration views

Location and types of viewers	Nature of views to proposal
	from North Condobolin Road.
Warroo – small number of residents in and around houses, small number of visitors to heritage sites	Medium to long duration views looking south east from several private houses, small farms and heritage buildings to the proposed solar plant and transmission line (approximately 8.8 km).
Jemalong Weir Picnic Area – moderate number of people engaged in recreation activities	Medium duration views looking west from public recreation area approximately 10.7km from transmission line and 12.2 km from the proposed solar plant.
Jemalong Polo Club – small number of people engaged in sport and recreation	Short to medium duration views from private facility (on involved property) looking west to transmission line (approximately 900 m) and south west to the proposed solar plant(approximately 3.7 km).
Jemalong Ridge – few if any people walking or working	Elevated views of unknown duration looking west to the proposed solar plant and transmission line (approximately 10 km). No public access or residences were identified in this study.
Wilbertroy State Forest – few if any people	Views of short duration looking north. Closest point of the proposed solar plant is approximately 3.5 km.
Local roads – small number of residents and workers on transport routes	Views of short duration. Local roads closest to the proposed solar plant/transmission line are Whispering Pines Lane, Driftway Road, Constables Road, Willawang Road, Murphys Road, Hodges Road, Waree Lane, Dowra Lane and North Condobolin Road.
Rural residences – small number of residents	Medium to long duration views by residents in and around houses. Closest houses are in Whispering Pines Lane.
Paddocks – small number of workers	Short duration views from paddocks and other farm facilities.

The Forbes LEP does not include any specific landscape character values for the rural zone that applies to the study area. The Forbes Development Control Plan 2013 Section 9.9 (Forbes Shire Council 2013b), covering scenic and landscape character for rural zones, lists the fairly general objectives to minimise the impact of development on the rural landscape and retain existing native vegetation and then focuses on minimising use of strongly contrasting bricks and finishes.

8.3.3 Potential impacts

Impacts on important views

From the results of the community consultation, there appears to be little concern in the local community about the visual impacts of the proposal. One concern was expressed regarding the location of the proposed transmission line in proximity to one of the residences. The design for the transmission line was subsequently changed to a route further away from that residence. The resident has been notified and is satisfied.

The landscape character of the productive agricultural landscape with some native vegetation was identified as what is valued by the community. The solar plant infrastructure would be unique infrastructure within this landscape.

Areas identified as tourist attractions to the area were the Lachlan River, Jemalong Weir and events in Bedgerabong. The assessment determined that the proposal (solar plant infrastructure and transmission line) is not expected to be visible from these areas.

Significance of visual impacts

Many elements of the proposal would not be seen except by visitors to the site and workers in paddocks near the Proposal Site. This is due to the flat terrain of the study area and because of the low height of PV modules and the screening vegetation surrounding the Proposal Site. The main visual effect identified is from the transmission line.

Twenty-six viewpoints were assessed separately, 24 viewpoints were considered to have low impact significance. The other two viewpoints were identified as likely to be significantly impacted due to the visibility of the transmission line. Predicted impacts to all viewpoints are summarised in Table 8-9 and illustrated in Figure 8-2. Mitigation measures have been recommended for the two viewpoints identified as likely to be significantly impacted. The photomontages prepared (Plate 8-1 and 8-2) illustrate the existing conditions and expected views of infrastructure from these locations.

Table 8-8 Summary of significance of visual impacts

Viewpoint	Visual impact significance	Comments
V1 Lachlan Valley Way 1	Not Significant	The Proposal is barely visible if seen at all due to distance to the proposed development.
V2 Murphys Road	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.
V3 Warroo Road	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.
V4 Willawang Road 1	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.
V5 Willawang Road 2	Not Significant	The Proposal is unlikely to be seen due to screening effects of vegetation and existing present infrastructure (sheds).
V6 Willawang Road 3	Not Significant	The proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation
V7 Driftway 1	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.
V8 House - Driftway	Not Significant	The Proposal is unlikely to be seen due to screening effects of vegetation.
V9 Lachlan Valley Way 2	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.

Viewpoint	Visual impact significance	Comments
V10 Hodges Road	Not Significant	The Proposal is unlikely to be seen due to screening effects of vegetation.
V11 House – Lachlan Valley Way	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.
V12 House 1 –Whispering Pines Lane	Significant	The proposed transmission line would be visible across the breadth of the view but are relatively small in height. The Proposal may be visible in patches through the vegetation, but will be mostly screened. Landowner is unconcerned. Mitigation measures are proposed.
V13 House 2 –Whispering Pines Lane	Significant	The proposed transmission line will contrast with existing elements and be viewed for extended lengths of time from house and garden. Visual effects of the Proposal would not be significant because of the small proportion of view occupied by development. Mitigation measures are proposed.
V14 North Condobolin Road West	Not Significant	The Proposal is unlikely to be seen due to screening effects of vegetation.
V15 Substation	Not Significant	Additional transmission line would be similar to existing visual character. Development unlikely to be seen due to screening effects of vegetation.
V16 Jemalong Polo Club	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.
V17 Bedgerabong West	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.
V18 Noakes Road	Not significant	The Proposal is unlikely to be seen due to screening effects of vegetation.
V19 Bedgerabong East	Not significant	The Proposal is unlikely to be seen due to screening effects of vegetation.
V20 Waree Lane	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.
V21 Dowra Lane North	Not Significant	The Proposal is unlikely to be seen due to screening effects of vegetation.
V22 Dowra Lane South	Not Significant	The Proposal is unlikely to be seen due to screening effects of vegetation.
V23 Specks Lane	Not Significant	The Proposal is unlikely to be seen due to screening effects of vegetation.
V24 North Condobolin Road East	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.

Viewpoint	Visual impact significance	Comments
V25 Jemalong Weir	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.
V26 Newell Highway	Not Significant	The Proposal is unlikely to be seen due to distance to the proposed development and screening effects of vegetation.

Cumulative impact

Cumulative visual impacts are assessed by reviewing the visual integrity and form of other built structures within the visual catchment of the proposed solar plant and transmission lines. Structures with similar scale and dominance are identified as having a level of visual impact that together with the proposal would have a cumulative visual effect.

The Jemalong CSP Plant will be located south, south-east of the proposal for the Jemalong PV Plant. Specific components of the CSP field that are likely to be more visible to sensitive receivers are the heliostats, which protrude into the vertical landscape. However, screening by vegetation from the viewpoint of the closest sensitive receivers minimises the significance of this impact to medium. The PV Plant, does not comprise any structures that would protrude to the extent of the heliostats and consequently the significance of impact from the development of the PV park is low. Taking into consideration the implementation of mitigation measures to reduce visual impacts, the presence of screening vegetation throughout the study area, the relatively low population density and the distance of publicly available views from Proposal Site; the cumulative impacts of the Jemalong Hybrid Solar park are considered low significance.

The transmission line has the greatest potential for cumulative impact since there are other transmission lines in the vicinity including one running along a similar route. The proposed transmission line is relatively short in length and follows a route where it is unlikely to be noticed by the public. Landscape screening plantings have already been undertaken by the proponent to screen neighbours views of the CSP Pilot Plant. These plantings also provide screening of the proposed transmission line. The cumulative effects are minor and not significant.

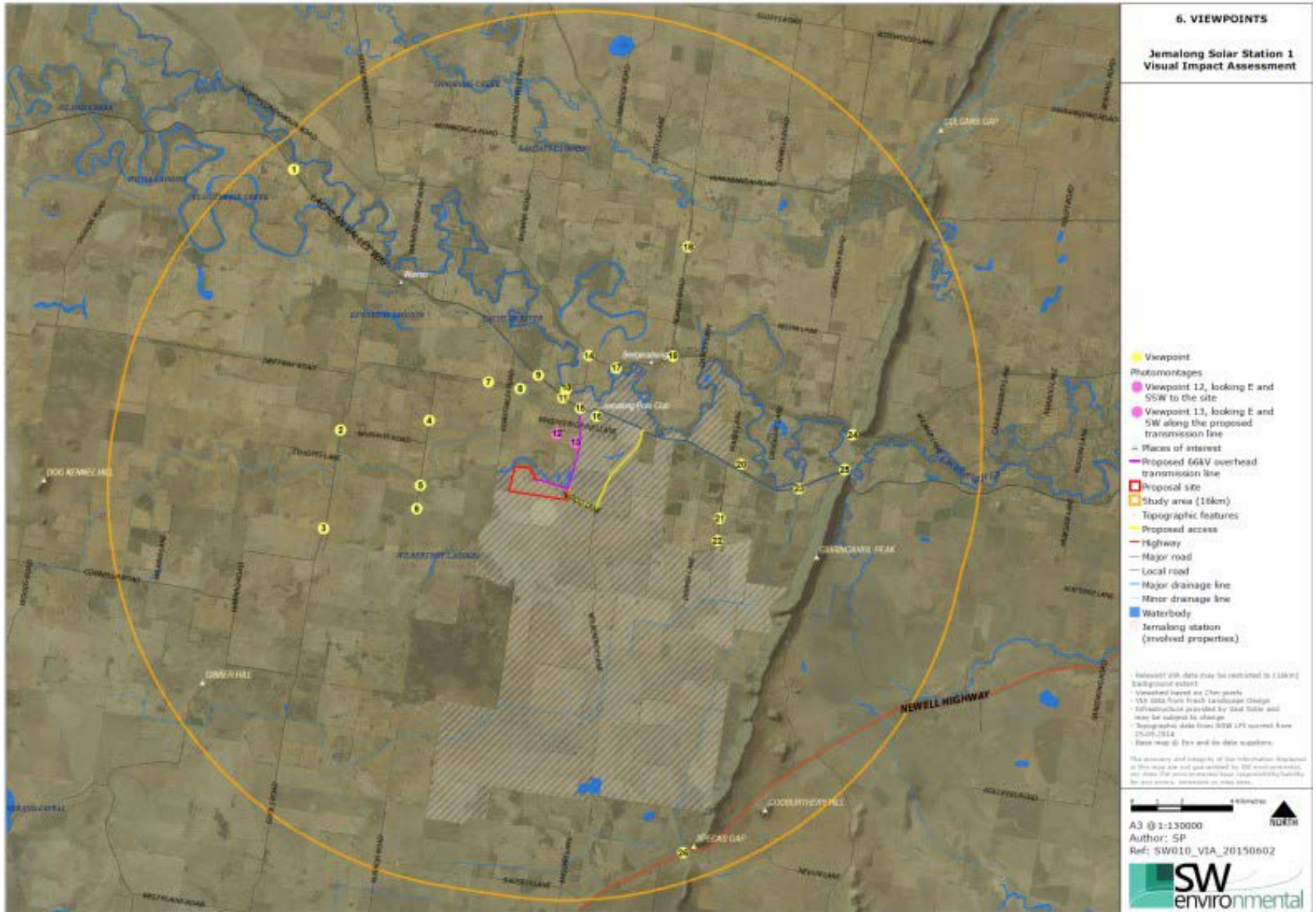

Figure 8-2 Viewpoints and observation points.

Plate 8-1 Photomontage V12 House 1 – Whispering Pines Lane.

Plate 8-2 Photomontage V13 House 2 – Whispering Pines Lane (A3 maps provided in full report, refer to DP&E's Major Project Portal.

8.3.4 Mitigation measures

Overall the visual impact of the proposed PV Plant development is of low significance. Where high visual impacts have been identified, there are not expected to be any significant residual visual impacts if the mitigation and management measures outlined below are implemented.

Table 8-9 Mitigation measures for visual and landscape character impacts

Mitigation measures	Phase
The following measures are recommended to reduce the general visual impact of the development: • PV Plant infrastructure should be reduced in height as far as practicable. • the materials and colour of onsite infrastructure will, where practical, be non-reflective and in keeping with the materials and colouring of existing infrastructure or of a colour that will blend with the landscape. Where practical: o buildings and other infrastructure will be non-reflective and in eucalypt green, beige or muted brown. o mounting systems for the solar arrays will be non-reflective. • security fencing posts and wire would be non-reflective; green or black rather than grey would reduce the industrial character of the fence.	Design
Parking areas, material stockpiles and other construction activities would be located as far as practical from nearby residences and roads or screened (by existing vegetation) for the period of construction.	Construction
Areas of soil disturbed by the project would be rehabilitated progressively or immediately post-construction, reducing views of bare soil.	Construction
Night lighting would be minimised to the maximum extent possible (i.e. manually operated safety lighting at main component locations) Light fittings shall be directional as deemed appropriate for their use and intended areas of illumination. Lighting column and lighting head design should be chosen to limit back spill and any unwanted light spill to other site areas or, those areas off the site. Strictly monitor the light intensity, direction and duration of lighting. Design and install lighting such that light bulbs and reflectors are not visible from public viewing areas. Lighting should not cause reflected glare.	Construction
A verification process would be implemented close to the completion of the construction phase. A Visual Verification Report and Landscape Plan would: • confirm the assumptions of this assessment by ground based assessment and ensure medium impacts are mitigated. • finalise the location and species for proposed screening, in consultation with nearest affected landholders. detail planting methods and maintenance requirements of the screen planting.	Construction
Select colours for above ground structures, including the construction site offices, sympathetic to the landscape character of the site.	Construction

Mitigation measures	Phase
The following screening requirements would be met: • planting would be more than one row deep and preferably be located on the outside of the security fence, so that it breaks up views of the fencing as well as onsite infrastructure. The final location of planting and density would be undertaken following verification of actual impacts. • the plant species to be used in the screen are to be native and consistent with existing vegetation types on the Proposal Site. They should be fast growing, with spreading habit. Species selection should be undertaken in consultation with a botanist. • vegetation should include a high shrub layer which would provide a more effective visual screen compared to trees as the panels would be maximum 3m high. Where feasible, plants selected should be of adequate size when initially planted to allow immediate effect as a visual screen. • the timing is recommended to be close to completion of construction so that actual and not predicted impacts of infrastructure are mitigated. The screen would be maintained for the operational life of the PV PLant. Dead plants would be replaced. Pruning and weeding would be undertaken as required to maintain the screens visual amenity and effectiveness in breaking up views.	Construction Operation

8.4 HYDROLOGY (INCLUDING FLOODING)

8.4.1 Background

In 2014 for the preparation of the CSP Plant EIS, a Flood Impact Assessment (FIA) was carried out by Southeast Engineering and Environmental (April 2015). Following the floods of 2016 and the suggestion to develop a PV Plant in the place of the CSP Plant, the proponent commissioned ARUP to undertake a second FIA in 2017 incorporating state of the art 2D modelling. As such, two flood impact assessments have been carried for the Proposal Site, each to identify the likely impacts of flooding on the infrastructure to be constructed on the Hallidays paddock and surrounds.

A summary of the FIA undertaken by Southeast Engineering and Environmental is provided in this section, as the results are still relevant to the Proposal Site's topographic and hydrological conditions, only the location of infrastructure and extent of the development envelope has changed with the introduction of the PV Plant. The results of the ARUP 2017 study (Summary Technical Report, November 2017) provides further information on potential impacts to PV Plant infrastructure.

The summarised results of both the 2014 FIA and 2017 FIA are provided in Section 8.4.4 Potential Impacts – Operation. The detailed specialist reports are provided in Appendix H1 Arup 'Summary Technical Report - Vast Solar Jemalong Modelling & Hydrology Study 2017' and Appendix H2 Southeast Engineering and Environmental 2014 FIA for the CSP Plant.

Finally, drawing from these two sets of studies, potential impacts and mitigation measures are recommended for the design and operation of the proposed PV Plant.

8.4.2 Existing Situation

The Proposal Site is located on the Lachlan River floodplain, immediately downstream of the Jemalong Gap. Floods in this area are common, and cover a vast area of the floodplain for prolonged periods (DECCW, 2009). The Jemalong Gap, is a significant hydraulic control with almost all floodwaters passing through this point. Downstream of the Jemalong Gap, large flows in the Lachlan River spill onto the northern and southern floodplains. Generally, the Lachlan River can be expected to convey approximately 15 per cent of flood flows with the remainder split between the north and southern systems.

The Proposal Site is located in the southern system of the Lachlan River (Figure 8-3) and is immediately downstream of the Jemalong Gap in an area considered to be a particularly sensitive to hydraulic modifications. The FMP categorises the floodplain into four hydraulically independent floodway network zones, each with different potentials for generating adverse hydraulic impacts. The site is located outside but adjacent to the boundary between Flood Network Zone A and Flood Network Zone B. Zone A is considered to be of very high significance (where very small flood level changes could produce significant flood flow redistribution between the southern and northern major flow paths) and Zone B is considered to be of high significance (areas where the flow redistribution and flood level increases have already been created and no further hydraulic impacts should be allowed).

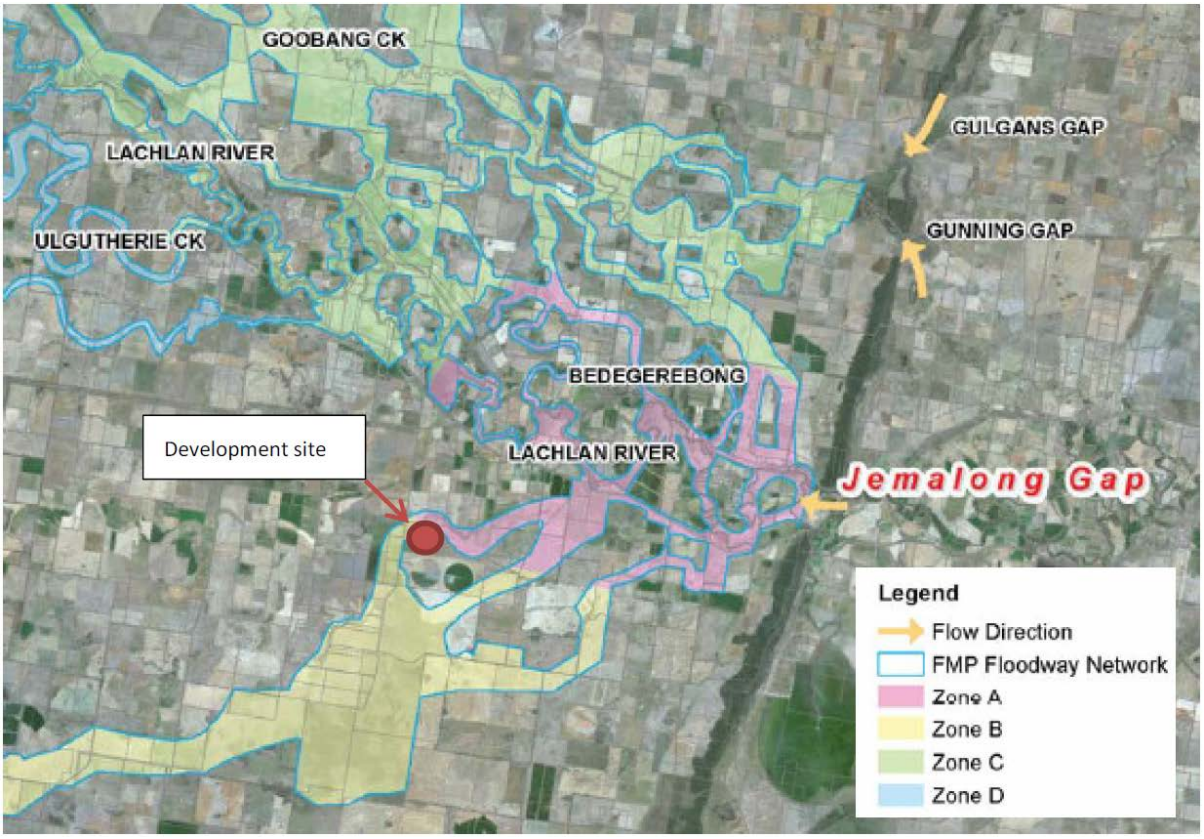

Figure 8-3 Flood network and zones for management

Floodplain management in the area has been influenced by modelling of significant flood events that occurred in 1952, 1974 and 1990. The adopted design flood for the FMP is the 1990 historical event and is identified as the 25 year Average Recurrence Interval (ARI) event. An existing levee (which generally follows the 1978 Guideline levee locations) is present in the location shown by the dark blue line in Figure 8-4. Figure 8-4 also shows approved levee locations that are located on Jemalong Station (Approval 70CW808642, converted to 70FW615691 in 1999). The landowner is the party responsible for the construction of the approved levee and the approved levee has been constructed and vegetation coverage on these levee's is well established.

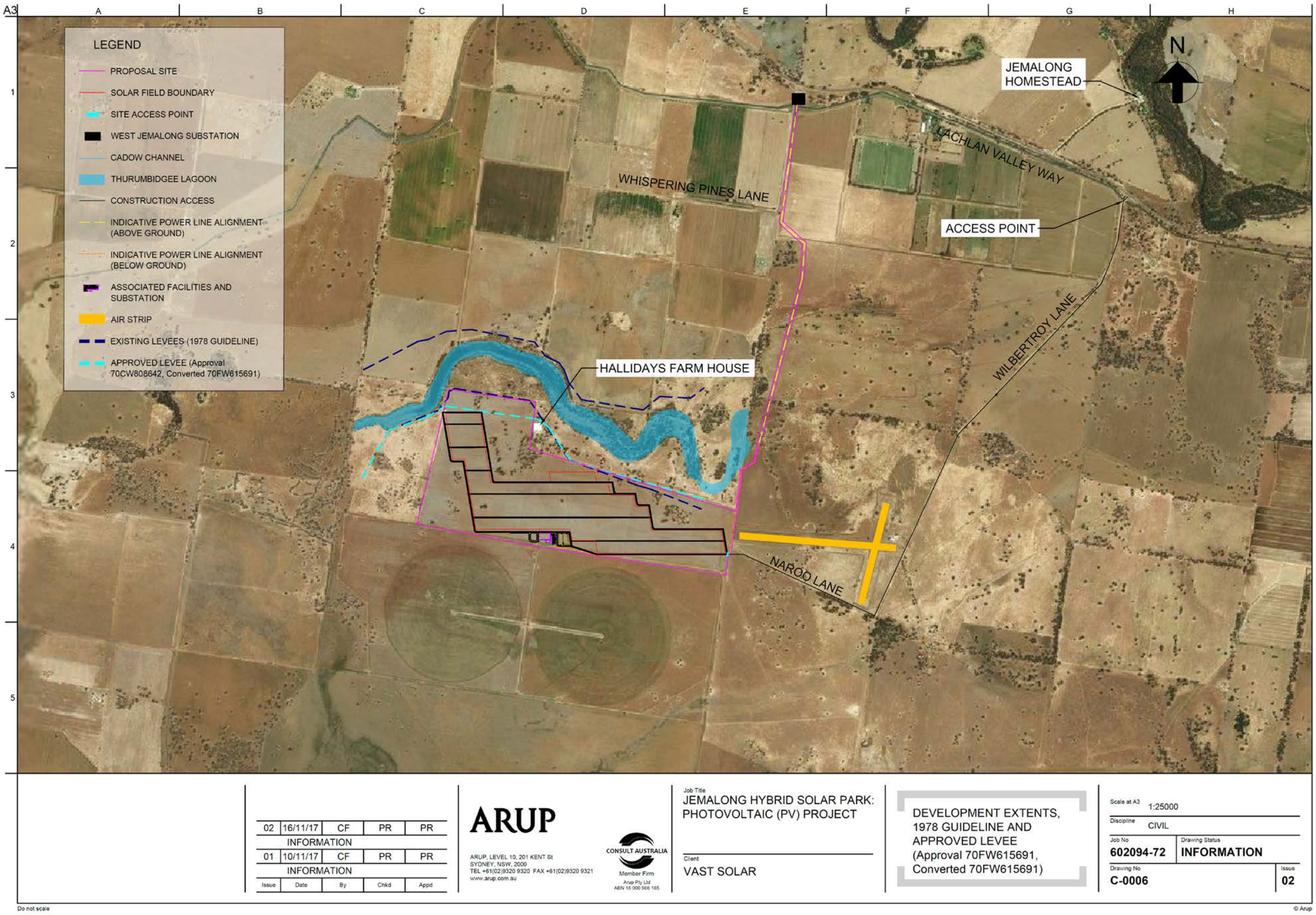

Figure 8-4 Development extents and 1978 Guideline Levees (purple) and FMP approved levee (light blue)

8.4.3 Floodplain planning controls

Works that are managed through the *Water Act 1912* are known as 'controlled works', which are generally earthworks, embankments or levees or other works that are likely to affect the flow of water that are also declared to be a 'controlled work'. Controlled works within the floodplain are either considered complying, or non-complying works under the *Water Act 1912*. The definition of 'complying' generally refers to where NSW Office of Water (NOW) is satisfied that the work complies with the floodplain management plan for the area in which the work is situated or proposed to be constructed. The key consideration for the proposal is whether the possible 'impact on overall flood behaviour could be significant and therefore far-reaching.'

As set out above, the floodway network has been divided into four zones based on the hydraulic impact of works within the floodway (non-complying works). The Proposal Site is located adjacent to Zone A and Zone B however no works within these areas are proposed.

8.4.4 Potential impacts

Construction

Activities occurring during the construction of the proposal would be confined to the development footprint shown in Figure 8-4. There would also be some additional works to upgrade Naroo Lane and Wilbertroy Lane. Construction works associated with the proposed development would be located within the designated floodplain area but outside the floodway and beyond the existing levee location (refer Figure 8-4). The proposal would therefore not result in modifications within the floodway or modifications to existing levees.

It is noted that while the Proposal Site is located outside of the floodway network, events greater than 4 % Annual Exceedance Probability (AEP) would overflow onto the floodplain, which did occur in 2017. Potential sedimentation impacts may result if this event was to take place during construction period.

These risks will be managed by the implementation of appropriate erosion and sediment control measures. If a heavy rainfall event was predicted, the site should be stabilised and work ceased until the wet period had passed. This measure is included in Section 9.1: Soils.

The design of the PV Plant includes the construction of surface drainage structures in association with roads and buildings at the site. A Site Drainage Plan covering the construction and operation phases would be developed prior to commencement of works (refer Section 9.2).

Operation

During operation, there would be no impacts to the floodway, levee banks or floodplain unless an event greater than 4 % AEP occurs, resulting in overflow onto the floodplain. Under these conditions, the PV Plant infrastructure may impact on flood flows by potentially altering flow behaviour as well as flood levels and distribution over the broader landscape. This is mostly as a result of changes in surface roughness that would occur as a result of the development (changes from managed pasture landscape to a large area of steel piles).

The FMP states that:

> "*Development outside of the limits of the FMP floodway network would not generally cause a significant redistribution of design flood flows or a significant increase in flood levels*".

However, it is noted that in some cases impacts could be significant, as such a FIA was conducted in 2014 and 2017 as discussed at the start of the chapter. The results and recommendations are provided herein.

2014 Southeast Engineering and Environmental FIA for the CSP Plant

The 2014 FIA report investigated the following issues in relation to the development:

- An assessment of any proposed modification to surface water management including modelling of redistribution of waters
- An assessment of the impact on neighbouring properties and the associated watercourse and floodplain including a review of the proposed levees in accordance with the requirements of the Lachlan River Jemalong Gap to Condobolin Floodplain Management Plan 2012 (FMP)
- An assessment of potential flooding impacts in accordance with the principles, processes and guidelines as outlined in the NSW Government Floodplain Development Manual, 2005

In assessing the potential impacts from the development, the following studies were reviewed:

- Guidelines for Floodplain Development; Lachlan River Jemalong Gap to Condobolin (WRC, 1978)
- Lachlan River, Jemalong Gap to Condobolin, Floodplain Risk Management Study (FRMS, DECC, 2009b)
- Lachlan River, Jemalong Gap to Condobolin, Floodplain Management Plan (OEH. 2012)

It was considered that an assessment of the available modelled events was sufficient to garner an understanding of the flood impacts associated with the development at the site. As such the modelling focused on events within those provided in the Floodplain Risk Management Study (DECC, 2009b) and the FMP.

The 2014 FIA recommendation to appropriately manage flood risk and protect infrastructure against flooding impacts, was to raise infrastructure above a selected flood level or flood proof infrastructure below the 0.5 % AEP flood level.

2017 ARUP FIA for the PV Plant

In light of the 2016 flood events, VAST Solar commissioned ARUP in 2017 to investigate the flood behaviour under the existing conditions at the PV plant. A fully dynamic two dimensional (2D) TUFLOW model was developed, with the primary objective being to define the flood levels and how these levels interact with the proposed PV Plant infrastructure. This study would also identify whether the Proposal Site requires flood protection of the infrastructure or other flood mitigation measures to decrease/eliminate the flood risk at the proposed PV Plant.

The TUFLOW model was set up to derive the flood water levels and velocities by converting runoff (from a hydrology model MIKE11) throughout the major flowpaths in the model's boundaries. The upstream boundary conditions were defined by the steady consistent peak flows of the 1990 storm event from the MIKE11 model. The downstream boundary conditions were defined by the peak flood levels of the 1990 storm event.

As such, the study simulated the 1990 storm event, which is equivalent to 25 year ARI as estimated in Lachlan River Jemalong Gap to Condobolin Floodplain Risk Management Study (Parsons Brinckerhoff, 2009). The 1990 event was selected because it was the most significant flood event with accurate upstream input data and was more significant than the 2016 storm and flood event.

The model results identified that the bulk of the site would not be impacted by flooding. Only the western portion of the PV Plant would be affected by a maximum predicted level of 0.5m water depth. The predicted total flood affected area is approximately 29 hectares. The results associated with the flood affected area are summarised in Table 8-10.

Table 8-10 Results Associated with the Flood Affected Area

Minimum Ground Elevation (m AHD)	Maximum Ground Elevation (m AHD)	Average Ground Elevation (m AHD)	Minimum Flood Depth (m)	Maximum Flood Depth (m)	Average Flood Depth (m)
214.78	215.48	215.27	0.07	0.56	0.29

The peak flood depths of 1990 event are shown in Figure 8.5

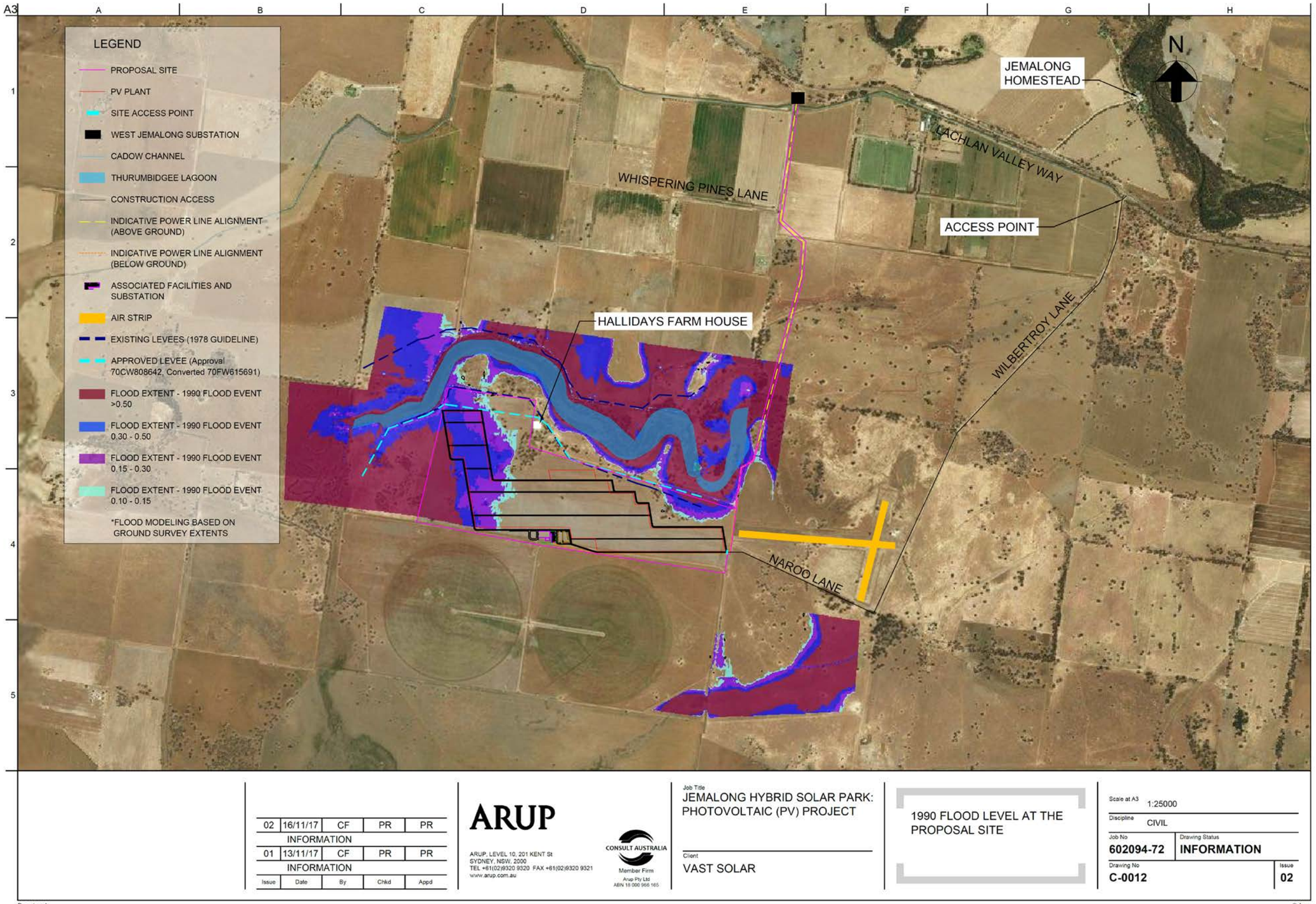

Figure 8-5 1990 Flood Levels at the Proposal Site

The flooding identified in the western part of the PV plant is due to the topography of the site, The Proposal Site dips towards this part of the field, however, the lagoon is lower still.

In the event of a 1 in 25y flood event, higher velocity waters will flow through the lagoon, not across the PV plant site. During such an event, local flooding occurs because the lagoon breaks its banks and water levels will slowly increase in the western section of the PV field. Consequently, scouring and erosion is highly unlikely at the Site and the PV Plant will not contribute to sedimentation within neighbouring bodies.

Flooding impacts on the proposal will be minimised by raising the height of PV modules in potentially affected areas, and by ensuring that critical infrastructure is not located in areas that could be impacted by significant flooding events. The construction of a levee is not necessary to minimise impacts of flooding on the PV Plant, its infrastructure and associated facilities.

Given the clean nature of the technology and operating protocols of the PV Plant, the water quality of any floodwaters contacting the site will not be adversely affected".

Other components of the proposal, may be susceptible to flood damage, in such an event the following hazards would be expected:

- electrical hazards to staff, emergency workers and assets due to inundation of infrastructure
- pollution risks from leakage of stored pollutants (hydrocarbons, pesticides, solvents)
- physical damage from the mobilisation of components in flood waters.

The design of buildings and equipment foundations would consider the potential for flooding at the site. No components are considered susceptible to becoming mobile and entering waterways. All potential pollutants stored on-site would be bunded and stored in accordance with HAZMAT requirements.

The establishment of perennial grass cover across the site would help maintain soil stability during floods, and would improve soil permeability over time.

Grazing under tree canopies adjacent to the Lagoon would be prevented, so as to prevent erosion and sedimentation entering the lagoon.

The design and construction of the internal access tracks will include soil erosion and sediment control measures.

A Flood Response Plan would be developed to manage the safety of workers and equipment in the event of extended flooding in the region.

8.4.5 Mitigation measures

The following management and mitigation strategy is recommended to manage flooding impacts associated with the development.

Table 8-11 Safeguards and mitigation measures for hydrology (including flooding)

Safeguards and mitigation measures	Phase
The design of buildings and equipment foundations would consider the potential for flooding at the site	Design/ Pre-Construction
PV modules in flood prone areas of the Proposal Site would be installed on modules of 3 to 3.5m high	Design/ Pre-Construction

Safeguards and mitigation measures	Phase
Earthen pads to be constructed for PCU's	Design/Construction
Critical infrastructure to be located in site locations that are not subject to flooding, 1/25 year event	Design/Construction
Use the cut-fill balance from the Proposal Site's grading program to elevate ground levels in flood prone area of the Proposal Site.	Design Construction
Grazing under tree canopies adjacent to the Lagoon would be prevented, so as to prevent erosion and sedimentation entering the lagoon.	Design Operation
The design and construction of the internal access tracks will include soil erosion and sediment control measures.	Design Construction
The Flood Response Plan covering all phases of the project would: • detail who would be responsible for monitoring the flood threat and how this is to be done • detail specific response measures to ensure site safety and environmental protection • outline a process for removing any necessary equipment and materials offsite and out of flood risk areas • consideration of site access in the event that some tracks become flooded • establish an evacuation point • define communications protocols with emergency services agencies.	Preconstruction Construction Operation Decommissioning

9 ASSESSMENT OF ADDITIONAL ISSUES

9.1 SOILS AND LANDFORMS

Topsoils are critical for agriculture and cannot be easily replaced within a human time scale. Adverse soil impacts can also have ecological impacts, affecting habitat condition, water quality and riparian ecosystems. Risks to soils are influenced by landscape position, slope, soil type, hydrology and land use.

NOW and the EPA identified issues relating to soil and water management as important during development of the SEARs for the proposal (refer Section 1.2). Specific issues raised by these agencies are addressed in this section.

9.1.1 Existing environment

Field Investigation

Investigation tests were undertaken for the Proposal between 23rd and 26th October 2017. The scope of geotechnical investigations across the site included:

- Nine test pits
- Ten dynamic cone penetrometer (DCP) test
- Four augered boreholes
- One standpipe installation (BH101)

Analytical results and plans indicating the soil test locations are provided in Appendix I. The following text summarises the main findings and conclusions

Soils and Landforms

The topography of the Proposal Site and surrounding area is flat within a low lying area of the Lachlan River Catchment. It lies in Lachlan Fold Belt geological region (Scheibner, 1996). The Lachlan Fold Belt is located across NSW and Victoria and is characterised by deformed, Palaeozoic deep and shallow marine sedimentary rocks, cherts and mafic volcanic rocks (Gray, 1997). Forbes 1:250, 000 Geological Sheet (Raymond *et al,* 2000) identifies as mostly alluvium including active depositional plains and terraces containing present day drainage. Small areas of the south west and south east sections of the Proposal Site is occupied by inactive alluvial plains.

Soil at the Proposal Site is mapped as three soil landscapes including Corinella, Scrubby plains and Warroo Channel (King, 1998). These landscapes specific locations in reference to the proposal area are described below in Table 6-17.

Table 9-1 Proposal area soil landscapes (King, 1998)

Soil landscape	Location	Description/Limitations
Corinella (alluvial)	Proposal Site, transmission line and access track.	Dominant soils of this landscape are deep (>100cm) Red Brown Earths. Soil limitations include sodicity/dispersability, hardsetting surfaces and low fertility. Landscape limitations include flood hazards. Topsoils in this soil landscape have a moderate erodibility. Erosion hazard is low.

Scrubby plains (stagnant alluvial)	Northern sections of the Proposal Site.	Dominant soil types include moderately deep (>80cm), brown clay.. Soil limitations include sodicity/dispersability, localised salinity, low permeability, high plasticity, Hugh shrink-swell potential. Low to moderate fertility. Landscape limitations include flood hazard, foundation hazard and seasonal waterlogging. Soil erodibility is moderate, and erosion hazard is low.
Warroo Channel (alluvial)	Northern end of the transmission line connection with existing substation.	Dominant soils of this landscape are Red Brown Earths, Alluvial soils and Podzoic soils. Soil limitations include sodicity/dispersability, high permeability and low fertility. Landscape limitations include seasonal waterlogging and known recharge area. Topsoils in this soil landscape have a high erodibility. Erosion hazard is moderate.

ESPADE (OEH, 2014) identified a number of soil profiles within the proposal area including within the Proposal Site, Thurumbidgee Lagoon and adjacent to Naroo Lane. None of these profiles showed evidence of salinity or acid sulfate soils (ASS). The soils were mapped as erodible (NSW Government, 2014). The Proposal Site had evidence of moderate wind erosion however it was noted to be stable and there was evidence of minor erosion around Thurumbidgee Lagoon and Naroo Lane. All soils were noted to be hard setting and cracking could occur during dry periods. Further the NSW Natural Resources Atlas searches did not show any occurrences of ASS or dryland salinity. It is expected that the soils in the proposal area are susceptible to erosion due to previous vegetation clearing and agricultural activities. Rural land capability mapping indicates that the site is not subject to severe limitations, and is generally suitable for cultivation (NSW Government, 2014).

A search of the OEH contaminated land public record (NSW Government, 2015a) was undertaken for contaminated sites within the Forbes LGA in September 2017. There was one record returned, Forbes Gas works. This contaminated site is located within the Forbes township, therefore not located near Jemalong Solar Station. The online *List of NSW contaminated sites notified to EPA* (NSW Government, 2015b) was also searched in September 2017. There are no sites listed in the Jemalong area, however there were six sites found in the Forbes area, these are all located within the Forbes township.

There is a risk of contamination associated with agricultural activities (e.g., use and disposal of pesticides). During a site inspection a farm waste site was located within the proposal area. The site contained mostly scrap metal and plastic, no chemical containers were located however, such material cannot be discounted as being buried onsite.

Preliminary Findings

The following observations have been made across the site by our geotechnical advisors based on their field work and laboratory analysis:

- The dry temperate / semi-arid climate, as well as flooding results in large moisture changes in the soil. Desiccation cracks were observed during the site investigations, indicating that reactive soils (high shrink-swell potential) are likely present on the site.
- The site is used for grazing of animals and growing of crops. There is therefore the potential for a deep organic topsoil layer to be present where crops are being grown.

- Lab tests results generally indicate an Emerson Class of 5 and 6 across the site, indicating non-dispersive soils.
- Soil sampling and analysis for presence of contamination indicated no traces of contamination, from heavy metals, hydrocarbons or pesticides and herbicides. The detailed discussion and laboratory results are presented in Appendix I.

9.1.2 Potential impacts

Construction and decommissioning

Construction activities at the Proposal Site have the potential to damage soils through loss of organic matter, structural breakdown and compaction, alteration of hydrological conditions, contamination with pollutants and imported material, mixing of profiles and wind/water erosion.

Construction activities which would result in soil disturbance include:

- the installation of the piles supporting the solar panels, which would be driven or screwed into the ground to a depth of 1.5-2.4m
- construction of internal access tracks and associated drainage
- substation bench preparation
- concrete or steel pile foundations for the inverter stations, substation and site buildings
- trenches up to 1000mm deep for the installation of cables
- establishment of temporary staff amenities and offices for construction
- construction of perimeter security fencing, CCTV and security lighting.

The soils at the site are assessed as having a moderate erosion risk, exacerbated by low permeability but mitigated by flat terrain.

Most of the earthworks at the site would be highly localised (such as building foundations) or have a very small footprint (array piles and fenceposts). The access track system would be constructed in association with drainage measures designed to minimise concentrated and accumulated runoff and flow distances. Wind erosion and the generation of dust would be minimised as required, for example using regular water applications.

Soil impacts associated with the construction and decommissioning activities would be minimised by undertaking works in accordance with the *Managing Urban Stormwater: Soils and Construction* series:

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

During excavation works, topsoil would be stockpiled separately and replaced above subsoils to restore the original soil profile, maintain site productivity and assist revegetation. Topsoil salvaged from the construction of the access tracks and other works would also be securely stored for use in site rehabilitation. Any topsoils stockpiled for an extended period would be managed to avoid contact with overland runoff, minimise weed infestation, and maintain soil organic matter, soil structure and microbial activity.

Soil contamination risks from any existing sources and the use and storage of fuels and other chemicals would be managed using best practice storage, use and spill preparation and response (refer also section 9.2).

Following the construction phase, a Site Rehabilitation Plan would be implemented remediating soils as required, removing rubbish, restoring profiles and decompacting soils in the construction areas.

Perennial grass cover would be established across the site as soon as practicable after construction. This would protect soils and improve soil structure, stability and landscape function over time.

Operation

The risks to soils during the operation phase of the Solar Field, after soils have been remediated, site drainage has been implemented and groundcover has been established, are expected to be minimal.

Rainfall and cleaning water runoff from the solar panels has potential to lead to localised soil splash impacts. The increased moisture availability and enhanced plant growth in the splash area would mitigate this impact.

The shading resulting from the panels is likely to reduce the vigour of vegetation growing under the array. The improved moisture relations created by the panels (reduced surface air movement, evaporation, and ground temperatures) are expected to offset the negative impacts of shading. A species mix which is tolerant of intermittent shading would be selected for the groundcover at the site. Potential responses to any persistent localised impacts under the array include revegetation, soil hardening and runoff dispersion.

The substation will be cooled with silicone or mineral Oil. Approximately 5,000 Litres of oil will be stored in the substation. Leaks and contamination of soils could occur during handling of oils, or damage to the substation components. Regular checking of facilities and routine maintenance will reduce the risk of incidents. The oil containment and fire safety measures outlined in Ausgrid (2017) NS189 Oil Containment for Major Substations, should also be implemented.

Soil stability and erosion throughout the site, including beneath the array would be monitored in association with the regular monitoring of groundcover.

9.1.3 Mitigation measures

Mitigation measures to avoid and minimise impacts to soils and landforms at the Proposal Site are provided in Table 9-2.

Table 9-2 Mitigation measures for soils and landforms

Mitigation measures	Phase
The solar array would be designed and installed to allow sufficient space between panels to establish and maintain perennial groundcover (subject to climatic conditions).	Preconstruction Construction
A CEMP would be implemented to manage runoff, soil erosion and sedimentation and pollution risks at the site. The CEMP would be prepared in accordance with the 'Blue Book' Volume 1 Managing Urban Stormwater: Soils and Construction (Landcom 2004), Volume 2A Installation of Services (DECC 2008a) and Volume 2C Unsealed Roads (DECC 2008b).	Pre-construction Construction
As part of the CEMP, a Soil and Water Management Plan (incorporating a Site Drainage Plan and Erosion and Sediment Control Plan) would be prepared, implemented and	Pre-construction Construction

Mitigation measures	Phase
monitored during the proposal to minimise soil and water impacts. These plans would include provisions to: • install, monitor and maintain erosion controls • identify and protect sensitive features such as native vegetation, dams and Irrigation channels • ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads • manage topsoil: in all excavation activities, separate subsoils and topsoils to restore natural soil profiles and assist revegetation, guided by the findings of the pre-works soil survey. Topsoils stockpiled for extended periods would be managed to avoid contact with overland runoff, minimise weed risks, and maintain soil organic matter, soil structure and microbial activity • minimise the area of disturbance from excavation and compaction and rationalise vehicle movements to minimise soil impacts • ensure any discharge of water from the site is managed to ensure ANZECC (2000) water quality criteria are met • as far as practicable, ensure excavations are not scheduled when heavy rainfall events are predicted or soils are saturated.	
The CEMP, OEMP and DEMP and relevant sub-plans should incorporate the following management recommendation: • soil disturbance should be kept to a minimum where higher localised salinity or sodicity may be present. Topsoil stripping should avoid mixing salty and/or sodic subsoils with the topsoil – testing is recommended. Excavation of subsoils should be limited and subsoils should be stockpiled and contained to avoid dispersion and sediment transfer • direction of surface waters and run-on should be avoided to minimise mobilisation of any salts stored in the soil • appropriate infrastructure design is required to avoid damage caused by shrink-swell clays • deep rooted vegetation should be maintained where present, ground clearing should be minimised and ground cover around the structures should be maintained where possible • seed bed preparation and rolling, gypsum and/or composted organic matter will improve surface structure and germination in coarse structured soils. Low intensity, deep watering should be used. Fertilisers should be applied before and during plant growing periods. Compaction relief may be required for revegetation • plant species used for revegetation need to be adapted to cracking, alkaline, moderately to poorly drained, fertile soils with high plant available water holding capacity.	Preconstruction Construction Operation Decommissioning
A contamination management plan would be developed to address: • Clean up of the existing farm rubbish site within the Proposal Site. Procedure for discovering buried contamination within the Proposal Site (eg pesticide containers). Disposal would be at a facility able to accept the waste.	construction
A water cart (or other means) would be utilised to manage dust on all access roads and exposed dusty surfaces in response to visual cues and complaints.	Construction Operation Decommissioning

Mitigation measures	Phase
Spill Response Plan would be developed as part of the overall Risk Management Plan to prevent contaminants affecting adjacent pasture and dams. It would: • Manage the storage of any potential contaminants onsite. Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures and remediation).	Construction Decomissioning
The substation will be cooled with silicone or mineral oil (5000L), oil containment and fire safety measures outlined in Ausgrid (2017) NS189 Oil Containment for Major Substations would be implemented.	Preconstruction Construction Operation
Following the construction phase, a Site Rehabilitation Plan would be implemented remediating soils as, removing rubbish, restoring soil and landform profiles and decompacting soils in construction areas.	Construction
Any area that was temporarily used during construction (laydown and trailer complex areas) would be restored back to original condition or re-vegetated with appropriate species (native in native dominated areas).	Construction
Live grass cover would be maintained at or above 70% at all times (subject to climatic conditions) to protect soils and landscape function. Any grazing stock would be removed from the site when cover falls below this level. Grass cover would be monitored on a fortnightly basis using an accepted methodology.	Operation