

## APPENDIX K VISUAL IMPACT ASSESSMENT





Powering a Sustainable Future

# Visual Impact Assessment

WALLA WALLA SOLAR FARM



OCTOBER 2019



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## Terms and definitions

<b>AEP</b>	Annual exceedance probability
<b>BLM</b>	Bureau of Land Management
<b>CEMP</b>	Construction Environmental Management Plan
<b>CSEP</b>	Community and Stakeholder Engagement Plan
<b>CSER</b>	Community and Stakeholder Engagement Report
<b>DECC</b>	Department of Climate Change (now BCD)
<b>DECCW</b>	Department of Climate Change and Water (now BCD)
<b>DOEE</b>	Department of the Environment and Energy (Commonwealth)
<b>DPE</b>	Department of Planning and Environment (now DPIE)
<b>DPIE</b>	Department of Planning, Industry and Environment (DPIE)
<b>DSEWPC</b>	Department of Sustainability, Environment, Water, Population and Communities (now DOEE)
<b>EIS</b>	Environmental Impact Statement
<b>EP&amp;A Act</b>	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
<b>EP&amp;A Regulation</b>	<i>Environmental Planning and Assessment Regulation 2000</i> (NSW)
<b>EPA</b>	(NSW) Environment Protection Authority
<b>EPBC Act</b>	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
<b>ha</b>	Hectares
<b>Heritage Act</b>	<i>Heritage Act 1977</i> (NSW)
<b>HAZMAT</b>	Hazardous Materials
<b>Hz</b>	Hertz
<b>km</b>	Kilometres
<b>kV</b>	Kilovolts
<b>LCU</b>	Landscape character unit
<b>LEP</b>	Local Environment Plan
<b>LGA</b>	Local government area
<b>LMZ</b>	Landscape management zone
<b>LRET</b>	Large-scale Renewable Energy Target
<b>m</b>	Metres
<b>mm</b>	Millimetres
<b>MVA</b>	Megavolt-ampere
<b>MW</b>	Megawatt
<b>MWh</b>	Megawatt hours
<b>NML</b>	Noise management levels
<b>NSW</b>	New South Wales
<b>OEH</b>	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water



<b>POEO Act</b>	<i>Protection of the Environment Operations Act 1997 (NSW)</i>
<b>PV</b>	Photovoltaic
<b>RE Act</b>	<i>Renewable Energy (Electricity) Act 2000 (Commonwealth)</i>
<b>REAP</b>	Renewable Energy Action Plan (NSW)
<b>SEARs</b>	Secretary's Environmental Assessment Requirements
<b>Sensitive Receiver</b>	A place or object that is sensitive to a particular environmental impact. e.g. school, place of worship, residence, heritage building/structure, pipeline (for vibration/blasting). These may be separately defined by government and industry policies and guidelines
<b>sp/spp</b>	Species/multiple species
<b>SRD SEPP</b>	<i>State Environmental Planning Policy (State and Regional Development) 2011 (NSW)</i>
<b>SSD</b>	State significant development
<b>VIA</b>	Visual Impact Assessment
<b>V</b>	Volts
<b>ZVI</b>	Zone of visual influence
<b>The proposal</b>	The construction and operation of the proposed solar farm
<b>The proponent</b>	FRV Services Australia Pty Ltd
<b>Subject land</b>	All land within the affected lot boundaries. The subject land comprises Lots 16, 17, 20, 21, 87, 88, 89, 108, 109 118 of DP 753735, Lot 3 253113, Lot 1 DP 933189, Lot A DP 376389 and Lot 1 DP 1069452, approximately 807 ha.
<b>Development site</b>	The area of land that is subject to the proposal. The development site is made up of 605 ha and includes the location of the proposed transmission line outside of the subject land. The development site is the area surveyed for this assessment prior to identified constraints and exclusions.
<b>Development footprint</b>	The area of land that is directly impacted by the proposal including solar array design, perimeter fence, access roads, transmission line footprint and areas used to store construction materials. The development footprint is approximately 493 ha.



# 1 INTRODUCTION



This Visual Impact Assessment (VIA) was undertaken to accompany the Environmental Impact Statement (EIS) for the proposed Walla Walla Solar Farm (proposal). It provides a full assessment of the visual impacts associated with the proposal, including:

- Landscape character and scenic vistas.
- Stakeholder values regarding visual amenity.
- Potential impacts on representative viewpoints.
- Addressing requirements of the SEARs.
- Addressing the requirements of the NSW Large-scale Solar Energy Guidelines (DPE, 2018).

The VIA includes a strategy to address identified impacts, including onsite vegetation screening, general design measures and a process to verify the actual visual impacts of the proposal. This improves the reliability of the measures and provides a trigger to undertake additional mitigation if required.

## SECRETARY'S REQUIREMENTS

*The EIS must also address the following specific issues:*

### Visual –

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

## RELATED KEY COMMUNITY CONCERNS & QUERIES

As part of the community engagement, the proposal's visual impact was deemed one of two of the proposed solar farm's largest community impacts. The greatest visual impacts were raised from direct neighbours whose outlook from their homesteads and businesses is towards the proposal.

Main community group affected:  
**DIRECT NEIGHBOURS**  
(specifically R1, R2, R3, R4, R5, and R6)

Four direct neighbours (R1, R2, R5 and R6) (and the two subject landowners – R3 and R4) have houses and/or working land with a direct outlook on the subject land.

1. Direct visual impact

2. Location of substation

3. Design of vegetation screening

4. Glare / reflectivity, and night

5. Indirect (local /regional) visual



## 2 APPROACH

The VIA was completed in the following stages:

1. Background investigations and mapping, including identifying Land Character Units (LCUs), defining where infrastructure may be visible in the landscape, and identifying key viewpoints such as major travel routes, potential residences and built up areas.
2. Field survey including reconnaissance, ground truthing and photography, and understand the likely sensitivity of LCUs within the landscape.
3. Consultation, including understanding community values and documenting community perception.
4. Impact assessment, describing the potential impact on visual amenity during construction and operation of the proposal.
5. Visual impact mitigation measures were developed in consultation with near neighbours including significant vegetation buffers and screening for people who would have a view of the residence.

The impact assessment methodology used in this VIA for operational impacts is based on the Bureau of Land Management (BLM) Visual Resource Management System, developed by the BLM, US Department of the Interior (n.d.). The BLM developed a systematic process to analyse the visual impact of proposed developments. The basic philosophy states that the degree to which a development affects the visual landscape depends on the visual contrast imposed by the project. Key steps undertaken to assess the visual impact are as follows:

- Define Landscape Management Zones (LMZ) for the representative viewpoints, based on:
  - The scenic quality of the study area's LCU.
  - The expected sensitivity at representative viewpoints.
  - The proximity of each representative viewpoint.
- Evaluate the degree of contrast the solar farm would generate at representative viewpoints in consideration of the management objectives of the relevant LMZ.
- Determine the acceptability of the contrast with the management objectives of the relevant LMZ; this is the resultant visual impact, rated as high, medium or low.

For the purpose of this VIA, a maximum rotation height of 4 m for the solar array was used as the basis for visual impacts from the majority of selected viewpoints. The TransGrid substation, with an approximate maximum height of 21 m was assessed for viewpoint 8 only. This VIS functions by comparing existing views from selected viewpoints to views of proposal infrastructure without mitigation measures (but with existing obstacles e.g. roadside trees and hills). Unmitigated views from viewpoints are then compared with projected views after mitigation measures proposed by FRV have been implemented.

### 2.1 PHOTOMONTAGES

Photomontages were prepared for selected viewpoints to provide a realistic impression of the operational solar farm. The viewpoints for the photomontages were selected based on distance to the development site, frequency of view from a public place and the location of the nearest sensitive residences. These are considered to be either the most potentially sensitive viewpoints or representative of a range of similar viewpoints.

A number of photomontages were also prepared for selected residences that have specific visual concerns about the proposal. These montages have not been included in this report due to privacy and were



produced as part of the community engagement process. Each montage shows a specific view from a particular residence and has been provided to the relevant resident. The photomontages were produced to facilitate discussion between the affected resident and the proponent.

The photomontages show an artist's impressions of the proposed solar farm and the extent of the view, based on available knowledge of the proposed activity at the time of preparation. Actual infrastructure types and location may be subject to change.

## **2.2 COMMUNITY VALUES**

Community consultation specific to the assessment of visual impacts for the proposal was conducted for near neighbours and the broader community.

### **2.2.1 Nearest neighbours**

- During January 2019, adjoining landholders were visited in person by Bison Energy including 5 uninvolved residences within a 2 km radius of the proposal.
- In May 2019, Urbaine Architecture visited the homes of residents identified through the engagement process that requested a visual montage. Montages of what the proposal may look like, including rendered images of solar panels, were created and provided to the relevant landowners in June 2019.
- Two open community meetings were held in May and July 2019 in Culcairn and Walla Walla, respectively.
- Between May and July inclusive, fliers with details about the proposal were posted on physical community noticeboards, the project's website and the Boarder Mail newspaper. Contact details for all residences within 3 km of the proposal were obtained during the community engagement process and all of these residents were invited to the second community meeting by email.
- All residents within a 3 km radius that requested follow up with the proponent during the community engagement period were contacted as per their requested contact method. This included face-to-face meetings, phone calls, emails and letters.
- In July 2019, FRV purchased the proposal and proceeded to engage with near neighbours, including screening options and modifying the layout design to minimise visual and noise impacts on nearby residences.
- FRV used the results of the initial VIA to develop a detailed Landscape Plan that includes clear setbacks and significant vegetation buffers.
- Third and fourth community meetings were held in Walla Walla to present the final (pre-approval) design that would be submitted in the EIS to DPIE for assessment.

### **2.2.2 Broader community**

A project website was developed to provide information and updates. The website went live in March 2019 and is updated periodically. An online comments section was also made available for the public to leave feedback or comments.

Community open days were held on 7 May, 9 July, 23 and 24 September 2019, inviting all interested parties to query and comment on the proposal. The first open day was advertised through the *Eastern Riverina Chronicle*, ABC radio segment and by direct invitation to known landholders within a 3 km radius. Fliers advertising the second and third meetings were posted on numerous public noticeboards within Walla Walla and Culcairn, the project website and all known interested members of the community



(approximately 70 registered parties) were invited individually. The second, third and fourth community open days were advertised in the *Boarder Mail* newspaper.

### *Feedback forms*

A feedback form was prepared to better understand the community's values and concerns regarding the proposal. Forms were distributed at the community open days and electronically through the project website, with the public encouraged to return the forms.

## **2.3 LANDSCAPE CHARACTER**

LCUs take into account topography, vegetation, land use, and other distinct landscape features. They are a way to summarise differences in the receiving environment that may affect the visual impact of the proposed solar farm at different locations.

Four LCUs were identified within Walla Walla and surrounding areas:

- Rural (including agricultural lands).
- Residential (viewpoints near rural residence/homes).
- Industrial (major roads, electrical and other built infrastructure).
- Commercial (businesses, town centre).

The scenic quality was rated in each LCU as follows:

- A high scenic quality rating describes areas with outstanding, unusual or diverse features.
- A moderate scenic quality rating applies to areas with the features and variety normally present in the character type.
- A low scenic quality rating is given to areas lacking features and variety.

The four LCUs identified are characterised in Table 2-1 in terms of their scenic quality.



Table 2-1 Key features of LCUs within Walla Walla and surrounds

Rural LCU
<p>Rural and agricultural lands within the study area are used predominantly for agriculture, grazing and rotational cropping of grains, cereals and pulses. The development site is positioned slightly lower in the landscape at approximately 220 m above sea level than the surrounds, however surrounding agricultural land use is generally located on land that is relatively flat to undulating. Expansive views within this LCU are generally limited given the undulating relief and screening provided by vegetation.</p> <p>Secondary sealed and unsealed roads including Benambra Road, Schneiders Road, Weeamera Road and Greenvale Road are the main vantage points from which to view agricultural areas. From the road corridors, agricultural and grazing land can be viewed openly. Patches of native and planted vegetation screen views of agricultural land from roadways. In addition to sections of road, overhead transmission lines are visible that reinforce rectilinear shapes and are common in rural landscapes.</p> <p>Surrounding blocks are made up of primary production land uses, with residences within this landscape being sparsely distributed but more concentrated towards the Walla Walla townsite to the west. Residences are commonly associated with some additional vegetation plantings. Other infrastructure includes agricultural sheds, buildings and low open fences.</p> <p><b>Scenic quality is considered moderate. Built elements are production-related and include linear fences, powerlines, roads, agricultural buildings and rural homes. Forms are typically uniform, of undulating elevation and linear. This LCU is common and the dominant LCU in the study area. The proposed solar farm is located within this LCU.</b></p>
Residential LCU
<p>Residential areas of Walla Walla and surrounds include viewpoints from the road near resident's homes. Much like the Rural LCU, the area is relatively flat to undulating with expansive views generally limited given the undulating relief and screening provided by vegetation. Views of the proposal from the area of concentrated residential dwellings located towards Walla Walla are blocked by sloping hillside and distance. Residents are broadly and unevenly distributed over the landscape, with properties commonly associated with additional vegetation planting and screening.</p> <p>Three uninvolved residences (R1a, R1b and R2) and one uninvolved hospitality business (R5a) overlook the proposal area. R1a is located within 80 m leased boundary of the proposal, directly north of Benambra Road.</p> <p><b>Scenic quality is considered moderate. Views vary in colour and form, and the proportion of large lot agriculture and smaller lot residential vary between residences, normal in this character type. Built elements include linear fences, powerlines, roads, agricultural buildings and rural homes. This LCU is common in the study area.</b></p>
Industrial LCU
<p>Industrial areas within the study area include the major Olympic Highway and Benambra Road, powerlines, large transmission lines and additional HV overhead lines, decommissioned railway line and Boral's aggregate quarry on Hurricane Hill. Common features in the LCU include the two-way sealed road, road reserve, fencing, powerlines and regular small and large vehicles.</p> <p><b>Scenic quality is considered low, with features matching the land use. Some screening is present along Benambra Road, Weeamera Roads and Olympic Highway, with broken views of surrounding rural land visible through existing native vegetation. The majority of residential homes are also screened from view by undulating landform and vegetation, which also breaks up expansive views of surrounding rural and residential land. This LCU is common in the study area, with the development site located approximately 2.5 km off Olympic Highway.</b></p>
Commercial LCU



Commercial lands within the study area include primarily the Walla Walla central business district, made up of two churches, post office, hotel, bowling club etc. The development site is not visible from the Walla Walla townsite, and as such is excluded from the assessment.

Orange Grove Gardens has been classified as moderate to high rural or residential LCU for the sake of this impact assessment.

**Scenic quality from Orange Grove Gardens is considered moderate to high, given the elevation and the nature of the business. A distant and limited view of the proposal is already partially screened with mature native vegetation, breaking up any expansive view of the proposal.**

The BLM methodology requires identification of representative viewpoints in the study area. These may be travel routes such as roads, waterways and recreational tracks, residential areas, tourist facilities, houses and farmland.

12 representative viewpoints were identified using the BLM methodology and within the Zone of Visual Influence (ZVI) and are mapped in Figure 2-1.

The predicted sensitivity of each viewpoint can be determined considering its proximity to the development site and factors such as use, scenic quality and regional significance.

Criteria for proximity are as follows:

- Foreground      0 – 1 km.
- Middle ground   1 – 2 km.
- Background      More than 2 km.

Criteria for scenic quality are as follows:

- High sensitivity:
  - high use routes or areas.
  - routes or areas of national or state significance.
  - areas with high scenic quality.
- Moderate sensitivity:
  - moderate use routes or areas.
  - routes or areas of regional or local significance.
  - areas with moderate scenic quality.
- Low sensitivity:
  - low use routes or areas.
  - routes or areas of low local significance.
  - areas with low scenic quality.

Considering the sensitivity of local viewpoints, the following assessments were made:

- **Rural viewpoints** were assessed as generally having a moderate to low scenic quality given the surrounding agricultural activities. Rural views are located on moderate to low routes, or areas only accessed by local traffic. As motorists use local roads, views increase as vehicles approach the development site. View durations are generally short as vehicle speeds are up to 100 km/hr, and the expected number of local vehicles on these local roads is considered to be low to moderate. Regional and local significance is low, with scenic quality being moderate.



- **Residential viewpoints** were assessed as generally having a moderate to high sensitivity. If there was a view to the solar farm, the view duration could be expected to be high from a residence.
- **Industrial viewpoints** were assessed as having low sensitivity and include Hurricane Hill Quarry, Olympic Highway and areas around existing powerlines. Any views from these areas would be fleeting due to vehicle speed, hard to discern and fragmented by existing roadside vegetation. Built structure is more commonly functional than aesthetic in these settings.
- **Commercial viewpoints** of Orange Grove Gardens were assessed as having moderate to high sensitivity given its location in the landscape and nature of operations.

The sensitivity of each viewpoint is provided in Table 2-2.

Table 2-2 Representative viewpoints and assessed proximity, scenic quality and sensitivity

ID	LCU	Distance to site	Scenic quality	Sensitivity
1	Rural	Background	Moderate	Low
2	Industrial	Background	Low	Low
3	Residential	Background	Moderate	Moderate
4	Residential	Background	Low	Moderate
5	Rural	Foreground	Moderate	Low
6	Residential	Foreground	Moderate	High
7	Rural	Foreground	Low	Moderate
8	Residential	Foreground	Moderate	Moderate
9	Rural	Foreground	Low	Low
10	Residential	Background	Low	Moderate
11	Residential	Middle-ground	Moderate	Moderate
12	Residential	Foreground	Moderate	Moderate



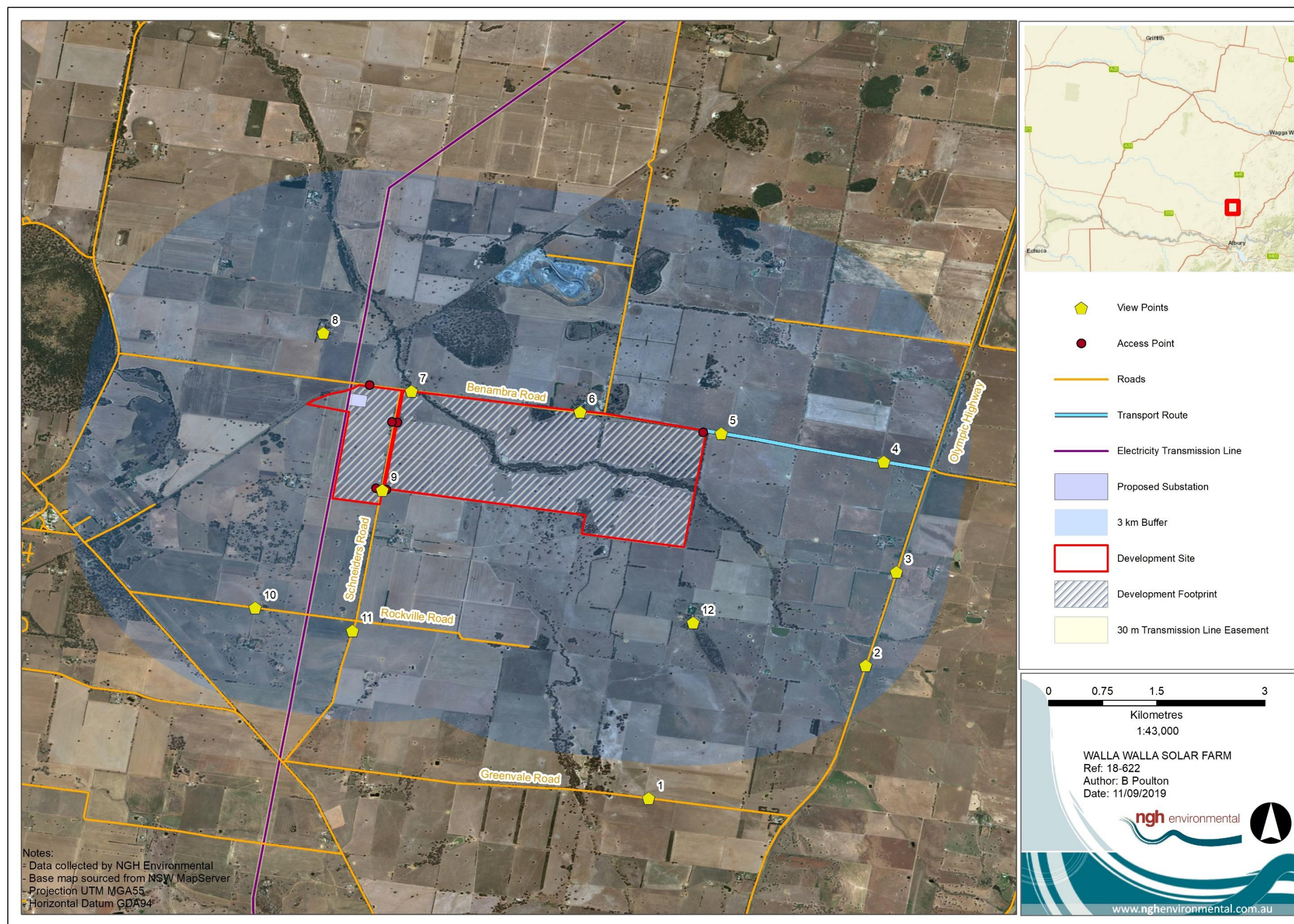


Figure 2-1 Location of representative viewpoints



## 2.4 DEFINITION OF LANDSCAPE MANAGEMENT ZONES

Visual LMZs were assigned to each representative viewpoint. The zones were derived by combining scenic quality (from the LCUs described in Table 2-1), viewer sensitivity and the distance to the proposed solar farm. Combined they produce a three-tiered management hierarchy: A – C, as shown in Table 2-3.

Table 2-3 Visual Landscape Management Zone decision matrix

Scenic quality	Proximity / sensitivity						
	Foreground High	Middle ground High	Background High	Foreground Moderate	Middle ground Moderate	Background Moderate	Foreground Low
High	A	A	A	A	B	B	B
Moderate	A	B	B	B	B	C	C
Low	B	B	B	B	C	C	C

Each zone has associated objectives to guide management of visual change and to help evaluate proposed project impacts. These are shown in Table 2-4.

Table 2-4 Visual Landscape Management Zone management objectives

Management priority	Management objectives
<b>A</b>	Maximise retention of existing visual amenity. Landscapes are least able to absorb change. Developments may lead to a major change.
<b>B</b>	Maintain existing visual amenity, where possible. Protect dominant visual features. Developments may be allowed to be visually apparent.
<b>C</b>	Less importance for retaining existing visual amenity. Landscapes are able to absorb change. Developments may be allowed to dominate but should reflect existing forms and colours where possible.



## 3 POTENTIAL IMPACTS

An operational visual impact assessment has been conducted considering:

- The proposed solar farm components.
- The potential for the proposed solar farm to be viewed from representative viewpoints.
- The degree of contrast the proposed solar farm would have within the identified LMZ. LMZs were assigned to viewpoints based on the results of the field work, and the contrast at that viewpoint was evaluated, as described below.
- The potential impact from glare.

### 3.1 EVALUATION CRITERIA

The ratings for the degree of contrast created by the proposed solar farm at each viewpoint have the following definitions (U.S. Department of the Interior, n.d.):

- High contrast: the proposal would be dominant within the landscape and generally not overlooked by the observer; the visual change would not be absorbed.
- Medium contrast: the proposed activity would be moderately dominant and noticed; the visual change would be partially absorbed.
- Low contrast: the proposed activity would be seen but would not attract attention; the visual change would be well absorbed.
- Indistinct: contrast would not be seen or would not attract attention; the visual change would be imperceptible.

To determine if the objectives for the VLM zone are met, the contrast rating for the viewpoint is compared with the relevant management objectives to give a visual impact level. The visual impact level is consequently defined as:

- High impact: contrast is greater than what is acceptable.
- Medium impact: contrast is acceptable.
- Low impact: visual contrast is little or not perceived and is acceptable.

For high impact viewpoints, mitigation must be considered.

### 3.2 PHOTOMONTAGES

Photomontages of the project shown within the existing context were prepared by Urbaine Architecture to assist in the impact assessment of the proposal. Three viewpoints were selected for the production of photomontages as they were determined to have the greatest potential for visual impact and best represent a range of distances and locations with differing views. Photomontages are based on a worst-case scenario of the project without the inclusion of proposed mitigation measures (i.e. vegetative screening). Where infrastructure is discernible in the landscape, rendered images have been included to provide clarity.

### 3.3 EVALUATION RESULTS

Table 2-2 evaluates the expected level of visual impact from the-representative viewpoints, while section 7.2 shows the proposed expected view (photomontage) of the solar farm without any mitigation measures



(i.e. vegetative screening or setbacks) and then with proposed mitigation measures. Following changes to the proposal design to reduce visual impacts on nearby residents, no high impact viewpoints were identified.

A total of three viewpoints for photomontages were selected, which are generally viewpoints determined to have the greatest potential for visual impact and best represent a range of distances and locations with differing views.



## **4 RESULTS SUMMARY**

### **4.1 MEDIUM IMPACT – MITIGATION SHOULD BE CONSIDERED**

Medium impacts are seen for 5 viewpoints.

Orange Grove Gardens has been recognised as having a potential impact due to its location in the landscape and the nature of the business, however the business is located over 800 m from the proposal and existing vegetative screening fragments the view of the development site. As a mitigation strategy, the solar array has been set back to make way for a significant vegetation screening buffer of 50 m, as proposed in the Detailed Landscaping Plan.

Viewpoint 6 is located approximately 80 m of the development site boundary with views overlooking the proposal. Existing vegetation and topography partially screen views of the development site. Dominant views would continue to be grazed and cropped agricultural land with the solar farm and associated infrastructure clearly visible in the middle ground. The form of the infrastructure, with maximum ratoon height of 4 m and in rectangular arrays, is not incongruous with the existing low-lying rectangular forms in this agricultural area. Due to the close proximity of R1a and R1b to the proposal, a substantial setback and screening vegetation would be implemented as a priority, to minimise the visual impact on these residences as much as practicable.

The viewpoint located on public locations along Benambra Road, and is representative of residences in the immediate area. Minor vegetation screening exists in the form of roadside vegetation, which provides minimal screening of the development site. The proposal would be highly visible to representative residences. On-site vegetative screening as a mitigation strategy has been considered in consultation with landowners and would be included in a Landscaping Plan approved prior to construction.

Viewpoints 5, 7 and 8 are also located within 1 km of the proposal and are representative of views from R2 and motorists along Benambra Road. Viewpoints have been assessed as having a moderate impact due the visibility of the TransGrid substation from R2. Solar arrays and the substation entrance would be clearly visible to motorists travelling along Benambra Road.

Existing native vegetation occurs along Benambra Road and is also sparsely present along Schneiders Road. Where dams and patches of native vegetation are to be enhanced for biodiversity, this would aid to break up views from local roads. The proposed location for the TransGrid substation was selected for providing minimal visual impact on R2 compared to the alternatives available.

### **4.2 LOW IMPACT – NO MITIGATION**

Low impacts are seen for arterial roads, residences and businesses, where views of the solar farm infrastructure would be difficult to perceive or is indistinct. Visual impacts on involved landholders who would benefit financially from the proposal are also considered low. Low impacts are expected for the majority of the study area and representative viewpoints due to distance to infrastructure, existing vegetative screening, retained on-site vegetation and the overall undulating terrain of the area. No mitigation is required for these locations.



## 5 GLARE

The potential for glare associated with non-concentrating PV systems that do not involve mirrors or lenses is relatively limited. PV solar panels are designed to reflect as little sunlight as possible, generally around 2% of the light received (Spaven Consulting, 2011), resulting in negligible glare or reflection. The reason for this is that PV panels are designed to absorb as much solar energy as possible in order to generate the maximum amount of electricity. The panels will not generally create noticeable glare compared with an existing roof or building surface (DoP, 2010). Seen from above (such as from an aircraft) they appear dark grey and do not cause a glare or reflectivity hazard. Solar PV farms have been installed on a number of airports around the world such as Darwin Airport.

Onsite infrastructure that may cause glare or reflections, depending on the sun angle, include:

- Steel array mounting - array mounting would be steel.
- Temporary site offices, sheds, PV boxes or PV skids.
- Perimeter fencing.
- Permanent staff amenities.

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



## 6 POTENTIAL CUMULATIVE IMPACTS

Adverse cumulative impacts occur when the infrastructure or activities at the solar farm site exacerbate the negative impacts of other infrastructure or activities occurring nearby. The location of Culcairn Solar Farm in proximity to the proposal and residences is shown in Figure 6-1.

### 6.1 CONSTRUCTION

During construction, the additional traffic and dust generation impacts are probably the greatest potential for cumulative visual impacts. The visual impact of increased traffic movements to the site would be predominantly limited to construction. A Traffic Management Plan (TMP) would be developed to minimise vehicle movements and dust as much as practical for construction. Should both of these proposed solar farm proposals be approved, the TMP would include scheduling of vehicle movements to ensure congestion along the shared transport route of Benambra Road is minimised.

Generally, adverse cumulative visual impacts are anticipated to be manageable due to the existing and retained vegetative screening and undulating terrain of the site that blocks out most views almost entirely. Specifically, screening to soften cumulative impacts near viewpoints 6 and 8 has been recommended on Benambra Road. Since FRV have relocated the primary construction access to the north eastern corner of the development site, residences on Benambra Road would be minimally impacted by the proposal. Should the Culcairn Solar Farm proposal be approved, and Benambra and Weeamera Roads are selected as a preferred construction transport route, visual disturbance for Residence 1a and 1b and Residence 2 would be exacerbated.

### 6.2 OPERATION

The operational view of the solar farm may generate a cumulative impact in contrast to existing agricultural views with Culcairn Solar Farm, should both projects proceed to operation. Before development of the detailed Landscaping Plan cumulative visual impacts would have been more noticeable for Residence 1a, Residence 1b and Residence 2, with two solar farms proposed within 1 km. Generally, adverse cumulative visual impacts are anticipated to be manageable due to the existing and retained vegetative screening and undulating nature of the site that blocks out the majority of views. Specifically, screening to soften cumulative impacts has been recommended.

During operation, excepting unusual maintenance operations such as inverter or transformer replacement, a small maintenance team using standard vehicles are all that would be required. Cumulative visual traffic impacts are considered manageable.



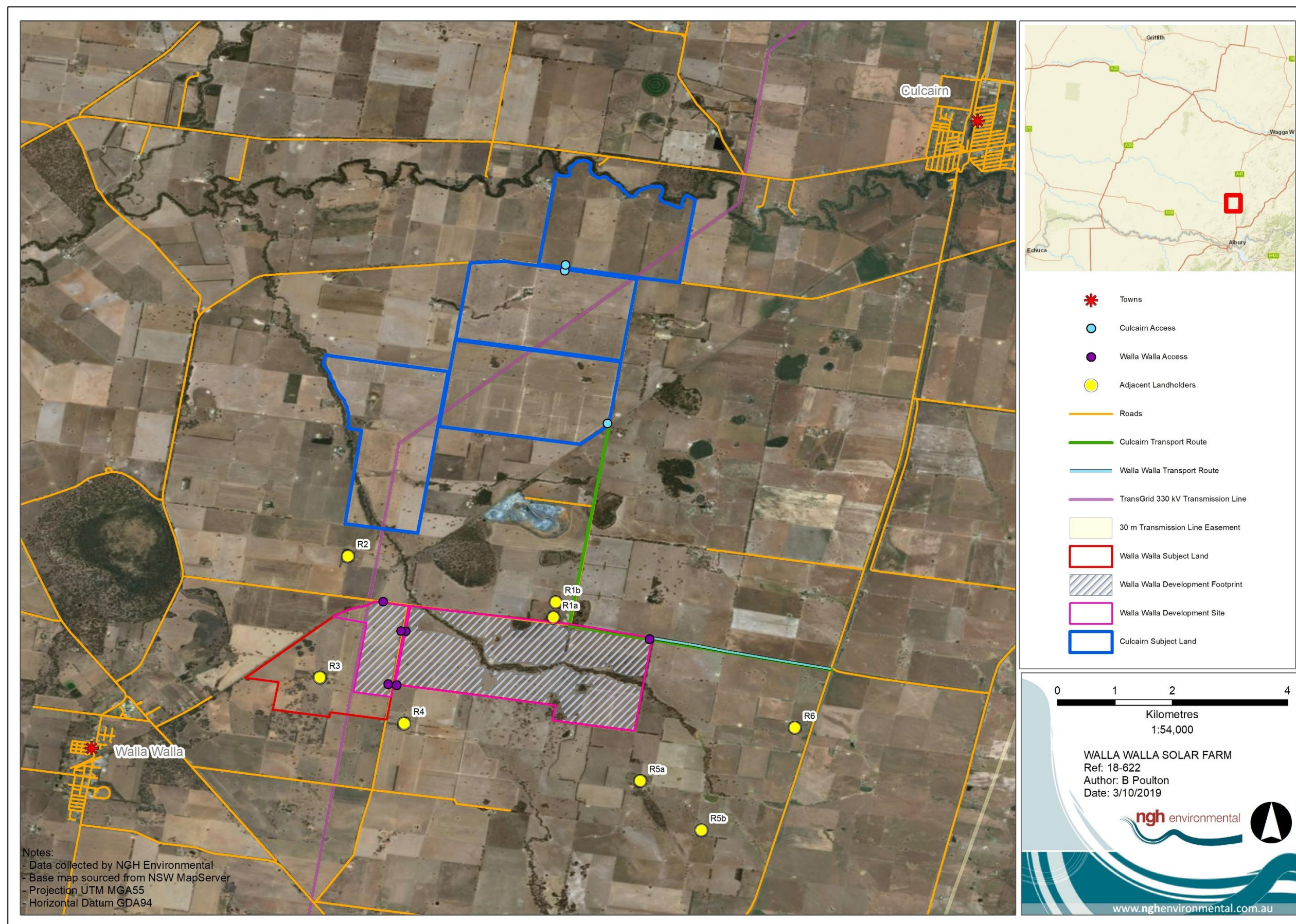


Figure 6-1 Cumulative impacts and proximity to the proposed Culcairn Solar Farm



## 7 MITIGATION STRATEGY

### 7.1 DETAILED LANDSCAPE PLAN

Screening vegetation has been considered in accordance with the draft planting layout provided in Figure 7-1 and Appendix E of the EIS. The purpose of the screening is to break up the view into the site. Screening requirements include:

- Plantings would be more than one row deep and where practical, planted on the outside of the permitter fence, to break up views of infrastructure including the fencing.
- The plant species to be used in the screen are recommended to be native, derived from the naturally occurring vegetation community in this area. They should be fast growing with mixed canopy height. Species selection could be undertaken in consultation with affected near neighbours and a botanist, horticulturalist or landscape architect.
- The timing is recommended to be chosen to ensure the best chance of survival and can commence during the construction of the proposal if timing suits.
- The screen would be maintained for the operational life of the solar farm. Dead plants would be replaced. Pruning and weeding would be undertaken as required to maintain the screen's visual amenity and effectiveness in breaking up views.



# WALLA WALLA SOLAR FARM

## BENAMBRA ROAD – WALLA WALLA

### KEY

- 1 Southern Vegetation Buffer – 50m width
- 2 Eastern Vegetation Buffer – 5m width
- 3 Construction Compound, O&M Area and Main Site Entrance
- 4 Water Pipeline
- 5 Northern Vegetation Buffer – 50m width
- 6 Gas Pipeline
- 7 Transgrid Access
- 8 Transgrid Substation
- 9 Northwest Vegetation Buffer I – 50m width
- 10 Overhead Transmission Line
- 11 Northwest Vegetation Buffer II – 10m width
- 12 Access Cross – North
- 13 Access Cross – South
- 14 Creek Crossing Point
- 15 Inverter Exclusion Zone – 400m radius
- 16 Northwest Vegetation Buffer III – 5m width



Figure 7-1 Detailed Landscape Plan



## 7.2 NEAR NEIGHBOURS

A number of visual concerns were raised by near neighbours and the general public. This includes devaluation of properties and homes reliant on their visual aspect (not land productivity), glare, removal of vegetation and change in land use.

Several adjacent landowners agreed that vegetation planting would assist in breaking up the views. Proposed vegetative screening locations based on initial consultation and visual concern can be seen below in Figure 7-1.

Changes made to the proposal layout following community engagement to minimise visual impacts on near neighbours include:

### 7.2.1 Residences 1a and 1b

#### Mitigation measures

As R1 is the closest resident to the proposal. R1a specifically is approximately 80 m north from the property boundary while R1b is approximately 350 m north of the property boundary. FRV have provided the following mitigation measures:

- Changed the site access. Originally, 3 main access points were proposed along the Benambra Road, with traffic travelling past these residences, creating unnecessary dust and noise impacts. FRV have abandoned these access points and created one single main access point to the north-east of the project, now approximately 1.4 km away from these residences, therefore dramatically reducing the impact.
- Existing, mature boundary vegetation would now be retained.
- Altered the solar array design layout, setting-back solar panels directly opposite the R1a and R1b homesteads. This is referred to as a 'visual set-back' and would be undeveloped and left as grazing paddocks. This would allow for more 'natural' view from the homesteads and create a sense of space.
- After this setback an extensive 50 m vegetation buffer would be implemented. A detailed landscaping plan has been created:
  - Specific species that would effectively develop across the understory, mid- and top-canopy structures.
  - Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna.
  - Erecting nesting and faunal boxes to encourage wildlife use of the area.
  - Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife.
- From this vegetation buffer, a further 10 m setback would be allocated for the Asset Protection Zone (APZ).
- After the APZ, only then would the solar farm security fence be installed.
- An additional 5 m minimum setback would occur before the solar array.
- From R1a, a 400 m radius 'inverter exclusion zone' would be implemented. Therefore, the design has been altered so no inverters would be installed within 400 m, to further reduce visuals.

Unmitigated impact	High
Residual impact	Moderate



# WALLA WALLA SOLAR FARM

## BENAMBRA ROAD – WALLA WALLA

### KEY

**5** Northern Vegetation Buffer – 50m width

**15** Inverter Exclusion Zone – 400m radius

50m wide revegetation area along northern boundary comprising a variety of indigenous tree, shrub, grasses and ground cover species to provide layered vegetation for visual amenity and habitat

Large evergreen trees e.g.  
*Eucalyptus blakelyi* (Blakely's Red Gum)  
*Eucalyptus melliodora* (Yellow Box)  
*Eucalyptus polyanthemos* (Red Box)

Medium evergreen trees e.g.  
*Acacia dealbata* (Silver Wattle)  
*Acacia implexa* (Lightwood)  
*Allocasuarina leuhmannii* (Bulloak)  
*Allocasuarina verticillata* (Drooping Sheoak)

Shrubs and groundcovers e.g.  
*Acacia acinacea* (Gold-dust Wattle)  
*Acacia rubida* (Red-stemmed Wattle)  
*Bursaria spinosa* (Sweet Bursaria)  
*Dodonea viscosa* subsp. *angustissima* (Narrow-leaf Hop-bush)

Asset Protection Zone / Firebreak – 10m wide



PLAN 1:4000

Figure 7-2 Mitigation setback and landscaping for Residences 1a and 1b





a) Existing undeveloped view



b) Infrastructure superimposed (prior to screening)





c) Infrastructure superimposed with proposed vegetation screening

Figure 7-3 Existing, original infrastructure and mitigated views from viewpoint 6



## 7.2.2 Residence 2

### Mitigation measures

R2 is located approximately 800 m north-west from the proposal. FRV have provided the following mitigation measures:

- Changed the site access. Originally, 3 main access points were proposed along the Benambra Road, with traffic travelling in close proximity to their driveway, creating unnecessary dust and noise impacts. FRV have closed these proposed access points and created one single main access point to the north east of the project, now approximately 4.4 km away from these residences, therefore dramatically reducing the impact.
- FRV have also changed the location of the proposed O&M facilities, which was originally proposed beside the TransGrid substation. It would now be located at the main access point, 4.4 km away from R2, therefore reducing any impact in the long term for this resident.
- FRV reinvestigated the location of the substation and have moved this piece of infrastructure 100 m south to accommodate the views of R2. This was at significant cost and time to FRV.
- By altering the location of the substation, mature boundary vegetation can now be retained, further protecting the views of R2.
- Solar panels have not been proposed in the most north-western section of the development site.
- Along with FRV moving the substation, an extensive 50 m vegetation buffer would be implemented. A detailed landscaping plan has been created:
  - Specific species that would effectively develop across the understory, mid- and top-canopy structures.
  - Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna.
  - Erecting nesting and faunal boxes to encourage wildlife use of the area.
  - Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife.
- Additional screening would be implemented in the north-west boundaries including 5 m and 10m buffers which would also help facilitate views of the project from R2.
- From the substation, a further 10 m setback would be established for the APZ.
- After the APZ, only then would the solar farm security fence be installed. After further consultation, FRV decided to not implement the security fence close to the property boundary and instead closer to the solar array and further away from R2.
- An additional 5 m minimum setback will would be implemented before the solar array.

Unmitigated impact	Moderate
Residual impact	Low



# WALLA WALLA SOLAR FARM

## BENAMBRA ROAD – WALLA WALLA

### KEY

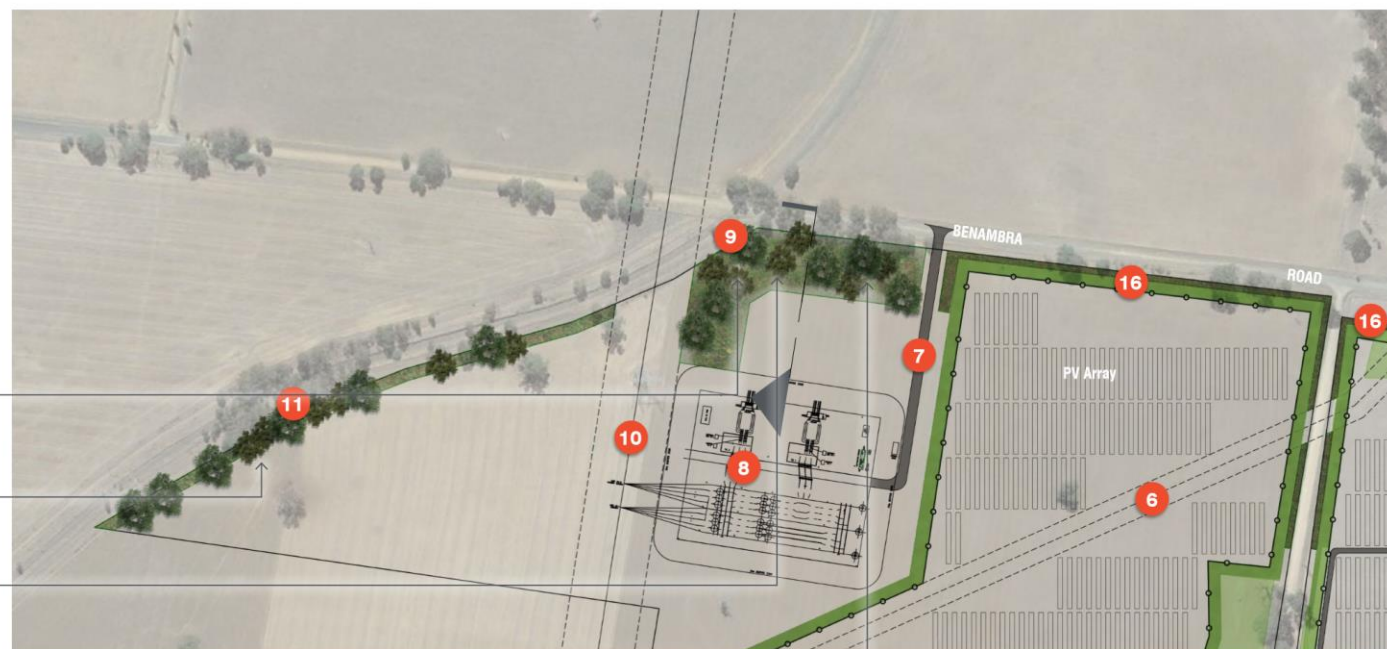
- 6** Gas Pipeline
- 7** Transgrid Access
- 8** Transgrid Substation
- 9** Northwest Vegetation Buffer I – 50m width
- 10** Overhead Transmission Line
- 11** Northwest Vegetation Buffer II – 10m width
- 16** Northwest Vegetation Buffer III – 5m width

Revegetation area along northern boundary comprising a variety of indigenous tree, shrub, grasses and ground cover species to provide layered vegetation for visual amenity and habitat

Medium evergreen trees e.g.  
*Acacia dealbata* (Silver Wattle)  
*Acacia implexa* (Lightwood)  
*Allocasuarina luehmannii* (Bulloak)  
*Allocasuarina verticillata* (Drooping Sheoak)

Large evergreen trees e.g.  
*Eucalyptus blakelyi* (Blakely's Red Gum)  
*Eucalyptus melliodora* (Yellow Box)  
*Eucalyptus polyanthemos* (Red Box)

Shrubs and groundcovers e.g.  
*Acacia acinacea* (Gold-dust Wattle)  
*Acacia rubida* (Red-stemmed Wattle)  
*Bursaria spinosa* (Sweet Bursaria)  
*Dodonea viscosa* subsp. *angustissima* (Narrow-leaf Hop-bush)



PLAN 1:4000

Figure 7-4 Substation relocation and landscaping for Residence 2





a) Existing undeveloped view



b) Infrastructure superimposed (prior to screening)





c) Infrastructure superimposed with proposed vegetation screening

Figure 7-5 Existing, original infrastructure and mitigated views from viewpoint 7



### 7.2.3 Residence 5a

#### Mitigation measures

R5a is located approximately 800 m south-east from the proposal. FRV have provided the following mitigation measures:

- Altered the solar array design layout, setting-back solar panels at least 65 m from the southern property boundary.
- Implementing this setback, has allowed FRV to therefore utilise this area and implement further mitigation by offering an extensive 50 m vegetation buffer along the full length of the southern boundary and 100 m travelling north along the eastern boundary. Following this 50 m buffer, an additional 5 m vegetation buffer would travel the full length of the eastern boundary to complement the existing mature vegetation that is present along the majority of the boundary. A detailed landscaping plan has been created:
  - Specific species that would effectively develop across the understory, mid- and top-canopy structures.
  - Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna.
  - Erecting nesting and faunal boxes to encourage wildlife use of the area.
  - Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife.
- From this vegetation buffer, a further 10 m setback would occur for the APZ.
- After the APZ, only then would the solar farm security fence be installed.
- An additional 5 m minimum setback would occur before the solar array.

Unmitigated impact	Moderate
Residual impact	Low



# WALLA WALLA SOLAR FARM

## BENAMBRA ROAD – WALLA WALLA

### KEY

- 1 Southern Vegetation Buffer – 50m width
- 2 Eastern Vegetation Buffer – 5m width

50m wide revegetation area along southern boundary comprising a variety of indigenous tree, shrub, grasses and ground cover species to provide layered vegetation for visual amenity and habitat

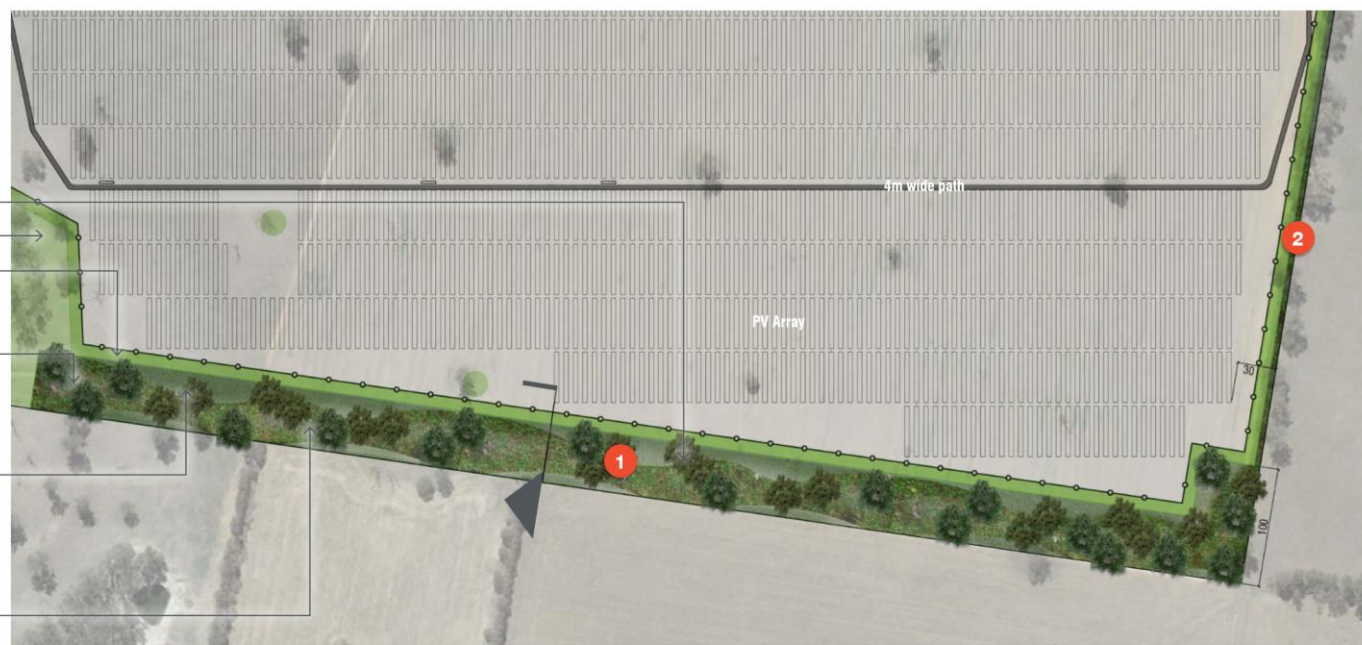
Development Exclusion Zone

Asset Protection Zone / Fire break – 10m wide

Large evergreen trees e.g.  
*Eucalyptus blakelyi* (Blakely's Red Gum)  
*Eucalyptus melliodora* (Yellow Box)  
*Eucalyptus polyantheros* (Red Box)

Medium evergreen trees e.g.  
*Acacia dealbata* (Silver Wattle)  
*Acacia implexa* (Lightwood)  
*Allocasuarina luehmmanii* (Bulloak)  
*Allocasuarina verticillata* (Drooping Sheoak)

Shrubs and groundcovers e.g.  
*Acacia acinacea* (Gold-dust Wattle)  
*Acacia rubida* (Red-stemmed Wattle)  
*Bursaria spinosa* (Sweet Bursaria)  
*Dodonea viscosa* subsp. *angustissima* (Narrow-leaf Hop-bush)



PLAN 1:4000

Figure 7-6 Mitigation setback and landscaping for Orange Grove Gardens





a) Existing undeveloped view



b) Infrastructure superimposed (prior to screening)





c) Infrastructure superimposed with vegetation screening

Figure 7-7 Existing, original infrastructure and mitigated views from viewpoint 12



#### 7.2.4 Residence 6

##### Mitigation measures

R6 is located approx. 2.2 km east from the proposal, with their dwelling surrounded by mature vegetation and therefore will have no views of the proposal from their dwelling itself. FRV have provided the following mitigation measures;

- Altered the solar array design layout, setting-back solar panels, committing to at least 30m from the adjoining property boundary to any solar infrastructure.
- Implementing this setback, has allowed FRV to therefore utilise this area and implement further mitigation by offering an 5m vegetation buffer along the eastern boundary. This will complement the mature vegetation which already exists along the majority of the eastern boundary. A detailed landscaping plan has been created;
  - Specific species that would effectively develop across the understory, mid- and top-canopy structures;
  - Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna; and
  - Erecting nesting and faunal boxes to encourage wildlife use of the area.
  - Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife.
- From this vegetation buffer, a further 10m setback will occur for the APZ.
- After the APZ, only then will the Solar Farm security fence be installed.
- An additional 5m minimum setback will occur before the solar array will occur.

Unmitigated impact	Low
Residual impact	Low

### 7.3 GENERAL MEASURES

The following measures are recommended to reduce the general visual impact of the development for all residences:

#### 7.3.1 Design

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:

- Buildings will be non-reflective and in eucalypt green, beige or muted brown.
- Pole mounts/piles will be non-reflective.
- Security fencing posts and wire will be non-reflective.
- Avoidance of unnecessary lighting, signage and logos.
- Retain and protect existing boundary landscaping.

#### 7.3.2 Construction

- During construction, dust would be controlled in response to visual cues.
- Areas of soil disturbed by the project would be rehabilitated progressively or immediately post-construction, reducing views of bare soil.



### 7.3.3 Night lighting

- Comply with all relevant standards, codes of practice and policies.
- Light spill is light that fall outside the area that is intended to be lit and can contribute to glare and waste energy. Spill light above the horizontal plane also contributes to artificial skyglow. All light fittings should be located aimed or shielded to avoid spill. Measures to prevent spill include:
  - Installing light fittings with an opaque cover and flat glass, mounted horizontally on both axes.
  - Mounting lights under part of a building (including awnings, verandah or roof) so light is blocked above the horizontal plane.
  - Design buildings to internalise lights.
- Wherever possible, light should be directed downwards. Mitigation measures include:
  - Installing direction fittings, such as floodlights or spotlights.
  - Use higher mounting heights that allow lower main beam angles that are closer to the vertical.
  - Lighting of all-night operations need to be downward facing of a peach colour and shielded.
- Operational light from the proposal must be directed downwards, or inwards towards the work area.
- Light fittings that are specifically designed to minimise light shining near to or above the horizontal plane should be used.
- Energy efficient globes include LEDs and high-pressure sodium.
- Where floodlights are required, wherever possible use fittings with asymmetric beams that permit horizontal glazing. These are to be kept at or near parallel to the surface being lit, usually the ground and should prevent light spill. An asymmetric beam also allows the light fitting to be mounted on the edge of an area and avoids the need for fittings to be tilted upwards. Flat glass light fittings should be installed with the glass horizontal to make efficient use of the brightest part of the beam and to eliminate light spill.



## 8 SAFEGUARDS AND MITIGATION MEASURES

Table 8-1 Safeguards and mitigation measures for visual impacts

No.	Safeguards and mitigation measures	C	O	D
VA1	<p>Screening would be required on-site, generally in accordance with the Landscape Plan developed in consultation with neighbouring landholders.</p> <ul style="list-style-type: none"> <li>Plantings would be more than one row deep and where practical, planted on specific sections outside of the permitter fence, to break up views of infrastructure including the fencing. Screening within the vicinity of Residences 1a and 1b and 2 and 5a would be within a 15 m buffer to allow for maximum screening.</li> <li>The plant species to be used in the screen would be native and derived from the naturally occurring vegetation community in the area. They should be fast growing and comprise a mixture of trees and shrubs capable of reaching a height of 3 to 4 m within 10 years. Species selection is being undertaken in consultation with affected near neighbours and a landscape architect.</li> <li>Planting would be 2 months of completion of construction, so actual views of infrastructure are known or during winter/spring to increase the chance of plant survival.</li> <li>The screen would be maintained for the operational life of the solar farm. Dead plants would be replaced. Pruning and weeding would be undertaken as required to maintain the screen's visual amenity and effectiveness in breaking up views.</li> </ul>	C	O	D
VA2	<p>Prior to the commencement of construction, a detailed landscape plan will be prepared including:</p> <ul style="list-style-type: none"> <li>Screening location.</li> <li>Species type.</li> <li>Planting density and spacing.</li> <li>Method for planting.</li> <li>Descriptive measures that would be implemented to ensure vegetative screening is successful (i.e. irrigation or other watering method).</li> </ul> <p>A program to manage, monitor and report on the effectiveness of implemented measures.</p>	Design stage		
VA3	The materials and colour of onsite infrastructure would, where practical, be non-reflective and in keeping with the materials and colouring of existing infrastructure or of a colour that would blend with the landscape.	Design stage		
VA4	During construction, dust would be controlled in response to visual cues. Areas of soil disturbed by the project would be rehabilitated progressively or immediately post-construction, reducing views of bare soil.	C		
VA5	Construction night lighting would be minimised to the maximum extent possible (i.e. manually operated safety lighting at main component locations). It would be directed away from roads and residents so as not to cause light spill that may be hazardous to drivers.	C	O	D



No.	Safeguards and mitigation measures	C	O	D
VA6	The vast majority on construction vehicles would enter the development site via the north eastern entrance on Benambra Road, 2.6 km off Olympic Highway to minimise impact on residences.	C		

*C: Construction; O: Operation; D: Decommissioning*



## 9 REFERENCES

- Bureau of Meteorology (BOM) (2019a) *Climate Statistics for Australian Locations*. Accessed online 10 March 2019 from [http://www.bom.gov.au/climate/averages/tables/cw\\_073151.shtml](http://www.bom.gov.au/climate/averages/tables/cw_073151.shtml)
- Chang, G.J. and Jennings, C. (1994). *Magnetic Field Survey at PG&E Photovoltaic Sites*. Accessed 6<sup>th</sup> April 2018, from <http://www.osti.gov/bridge/servlets/purl/82309-WOEtJb/webviewable/82309.pdf>
- Spaven Consulting (2011) Solar photovoltaic energy facilities: assessment of potential for impact on aviation. <https://www.solarchoice.net.au/wp-content/uploads/Reflectivity-of-Solar-Electric-PV-Modules.pdf.pdf>
- U.S. Department of the Interior (n.d.) Visual Resource Management. Accessed on 10 June 2019 from <https://www.blm.gov/programs/recreation/recreation-programs/visual-resource-management>
- U.S. Department of Energy. (2004). *PV FAQs*. Accessed January 2017 from <http://www.nrel.gov/docs/fy04osti/35489.pdf>