Stringybark Solar Farm

Stringybark Solar Farm Pty Limited

Landscape and Visual Impact Assessment

| FINAL 1.0

August 6, 2019

LVIA 2.0

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Contents

1. Introduction

Stringybark Solar Farm Pty Limited (the Proponent) is seeking development approval to construct the proposed 29.9 MW Stringybark Solar Farm (the Project) approximately 12.0 km south east of Armidale NSW.

The project was originally proposed as part of a larger single solar farm extending from Grafton Road to the north, reaching over a local vegetated range to Gara Road to the south.

In response to early discussions with key stakeholders and preliminary environmental assessments, the project has been separated into two discreet projects by removing the elevated panel section reaching over the hill.

This report assesses the potential landscape visual impacts that might be brought about by the Stringybark Solar Farm.

1.1 Purpose of this report

Jacobs have been engaged by the Proponent to conduct this landscape and visual impact assessment (LVIA) which will form part of the Development Application.

The purpose of this report is to determine the potential visual impacts that may arise as a result of the Project.

2. Methodology and Report Structure

The methodology used within this LVIA includes the following steps.

2.1 Project Description

This chapter will outline and describe the visual components of the Stringybark Solar Farm. These include, but are not limited to, photovoltaic solar panels and the associated mounting system, inverters, access roads, security fencing and a substation. The major visual component of this project will be the photovoltaic panels and the inverters. These will be the main focus of this assessment.

2.2 Define the Viewshed / Study Area

Defining the viewshed of the Project is based upon the key elevation or overall change in height that might be brought about by the key components of the Project. The viewshed is the distance or extent at which the visual changes brought about by the project may be recognisable change in views based on parameters of the Human Vision. The rationale behind the definition of the viewshed is discussed in Section 4.1 of this report.

2.2.1 Zones of Visual Influence (ZVI)

Zones of visual influence seeks to quantify the scale of the potential effects of a Project over varying distances. This step is a useful measure to contemplate the potential for visual dominance of the project in views.

2.2.2 Seen Area Analysis

A Seen Area Analysis (SAA) utilizes Geographical Information Software (GIS) to map the theoretical visibility of the Project from locations within the Project viewshed. This study is based upon broad topographical data alone. The SAA is a conservative analysis tool as it does not take into account other factors that may affect visibility, such as intervening vegetation, built form or minor topographical changes such as roadside cuttings and dam walls.

2.3 Planning Policy Framework

This Chapter will define the relevant policies and provisions that apply to areas within the study area of the Project.

2.4 Landscape Character and Sensitivity

Landscape Units are based upon the physical characteristics of the landscape, the use of the land and the protections provided by the relevant planning schemes, polies and objectives.

Characteristics that contribute to defining landscape character and sensitivity include geology, topography vegetation, land use and zoning. Other factors such as the extent of modifications to the landscape such as clearing or urban development provide guidance on the sensitivity of an area and its ability to accommodate further change.

The sensitivity of the landscape unit assists to determine the degree to which the landscape may visually accommodate further change or the change being proposed by the Project. Generally, the greater the extent of existing modification to a landscape, the lesser it's sensitivity to change.

Mapping community perceptions of renewable energy projects in the landscape is a valuable step in assessing visual impact particularly when contemplating a particular type of change. Renewable energy projects,

particularly wind and solar installations are unusual in that overall, they are perceived as positive elements in many landscapes. This acceptance is dissimilar to many other types of infrastructure which are generally perceived as negative. However, it must be noted that generally, community support for renewable energy projects is lessened when the projects are sited in immediate proximity to sensitive receptors, such as residential dwellings.

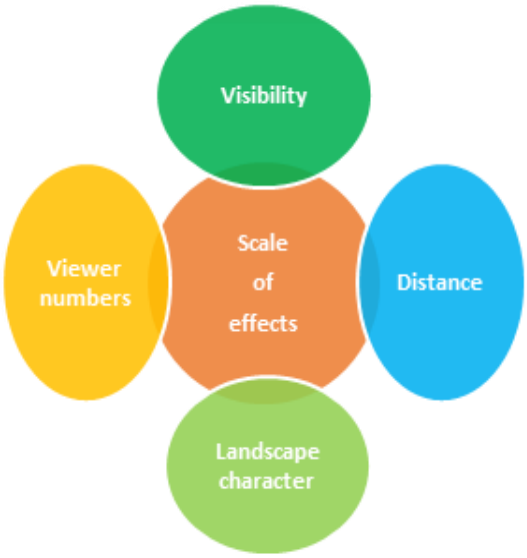
It is important that perception data is understood and recognised when considering landscape sensitivity and visual impact. The results of local and several overseas studies, which share similar findings to Australian studies, are discussed in Section 7 of this report.

2.5 Assessment of Publicly Accessible Viewpoints

This chapter will assess the visual impact from indicative viewpoints within the public domain.

When assessing the visual impact of a solar farm from the public domain, the assessment is based on four criteria, namely visibility, distance, landscape character & viewer sensitivity and the number of viewers.

- **Visibility**: The visibility of project elements can be affected by intervening infrastructure, vegetation and topography.
- **Distance:** Visibility decreases as distance from the project increases. Determining the Zones of Visual Impact (ZVI) gives an indication of the impact based solely on distance. Distance cannot be considered in isolation or disregard other criteria such as landscape character or visibility through screening.
- **Landscape Character and Sensitivity:** A landscape character assessment considers the character of the surrounding landscape both at the proposed development site and around the viewpoint locations. Sensitivity may be determined by previous landscape modifications (e.g. cleared farmland has a lesser sensitivity to landscape change than a pristine landscape such as a national park), as well as the land use type (e.g. residential sites will always be rated a sensitivity value of 'high', whereas industrial areas may be rated as 'low' sensitivity)



- **Viewer numbers:** The level of visual impact decreases where there are fewer people able to view the Project. Alternatively, the level of visual impact may increase where the viewing location is a known vantage point, such as a lookout. Viewer numbers from a recognised vantage point would be rated as 'high'.

These four criteria must be considered in the assessment of each viewpoint. However, the ratings of each criterion are not numerically based and cannot be simply added together and averaged to arrive at an overall rating.

The resultant scale of effects ranges from Negligible to High.

2.6 Scale of Effects

The scale of effects rates the overall visual impact from an assessed viewpoint.

2.6.1 Negligible Visual Impact

Negligible – minute level of effect that is barely discernible over ordinary day-to-day effects. The assessment of a 'negligible' level of visual impact is usually based on distance. That is, the solar farm is at such a distance that, when visible in good weather, it would be a minute element in the view within a modified landscape or will be predominantly screened by intervening topography, vegetation or buildings and structures.

2.6.2 Low Visual Impact

Low - visual impacts are those where the project is noticeable but that will not cause significant adverse impacts. The assessment of a "low" level of visual impact will be arrived at if the rating of any one or more of the four criteria, (visibility, distance, viewer numbers and landscape sensitivity), are assessed as low. Therefore, an additional piece of infrastructure in a landscape which is man-modified, and which already contains many examples of existing infrastructure may be rated as a low level of visual impact.

2.6.3 Medium/Moderate Visual Impact

Medium/Moderate - visual impact may occur when several of the four assessment criteria are considered as higher than "low" or the visual effects are able to be mitigated / remedied from an initial rating of High. This will of course be moderated by the context of the existing view and the modifications within the landscape.

2.6.4 High Visual Impact

High or unacceptable adverse effect – extensive adverse effects that cannot be avoided, remedied or mitigated. The assessment of a "high or unacceptable adverse effect" from a publicly accessible viewpoint requires the assessment of all criteria to be high. For example, a highly sensitive landscape, viewed by many people, with the proposed solar farm in close proximity and largely visible would lead to an assessment of an unacceptable adverse effect.

2.7 Photomontages

Photomontages are used within the report to show the anticipated change to the existing landscape created by the development of the solar farm. Photomontages can assist in visual assessment by illustrating the scale and location of the proposed solar farm infrastructure.

2.7.1 Lens size and photos used within the photomontages

Photomontages typically show the changes in a 60° horizontal field of view. The 60° horizontal field of view represents the central cone of view in which symbol recognition and colour discrimination can occur. When defining vertical field of view, either 10° or 15° can represent the central field of view of human vision as shown in Figure 2-1.

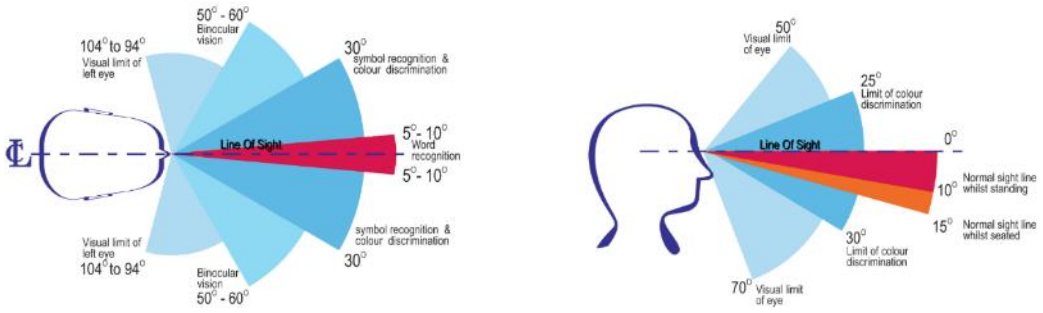


Figure 2-1: Horizontal and Vertical field of view (Human Dimension and Interior Space, Julius Panero & Martin Zellnik, Witney Library of Design,1979)

Similar data can be found in the more recent publication entitled 'The Measure of Man and Woman, Revised Edition', Henry Dreyfuss Associates, John Whiley & Sons, 2012.

The 60° horizontal field of view is important if the photomontage images represent the change in the landscape. The A3 photomontages, which are appended to this report in Annex A, include a 60° horizontal field of view. One of the sheets within the photomontage set shows a wireframe view of the computer model to illustrate how the photomontages were derived. Vertical 'poles' within this wireframe are merely points on the landscape such as a group of trees, a corner of an existing building etc., which allow the computer model (prepared in 3D Studio Max) and the photograph to be accurately aligned. This ensures that the proposed solar farm is accurately located within the photograph and then the rest of the model is removed, and the solar farm is rendered into the image.

2.7.2 Photographs

A 70 mm lens on a Nikon D850 digital camera has a picture angle of 26.5° and a horizontal angle of view of approximately 21.3°. https://imaging.nikon.com/lineup/dslr/basics/19/01.htm.

Four photographs overlapped 1/3 to create an image approximately the same as the central cone of view of human vision, i.e. 50-60° horizontal and 15° vertical. Figure 2-2 demonstrates this theory.

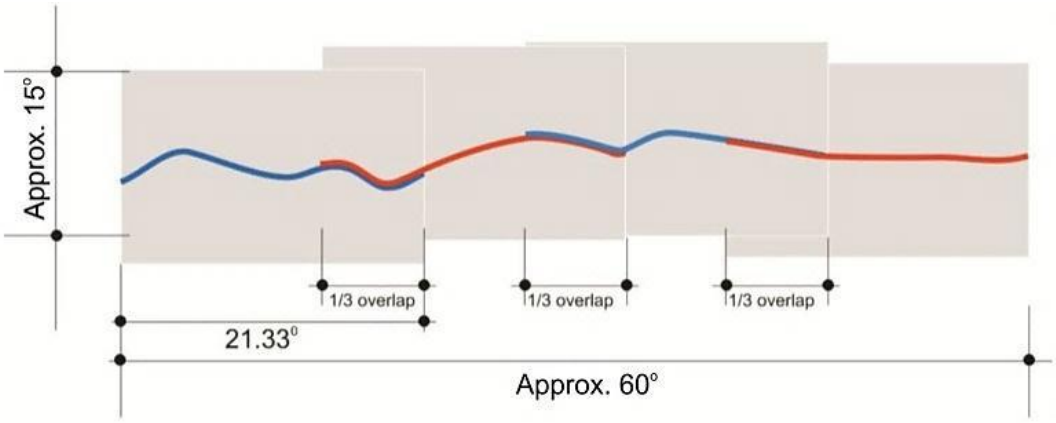


Figure 2-2: Photomontage layout

2.7.3 Computer modelling and the wireframe model

Cadastral data as well as the proposed development are modelled within a computer program (3D Max). A virtual camera is set up in the model at the GPS coordinates for each of the photographs that are being used within the panorama.

The digital model or wireframe view is then overlaid on the photographic panorama. Known points within survey information such as topography, building locations or other infrastructure are registered into the base photographs (or other predetermined points). For technical accuracy, these points must align. This verifies the location and apparent height and scale of the proposed development.

After the background reference points have been aligned, the wireframe is removed, leaving only the proposed solar farm facilities, which are rendered, either to match the lighting conditions at the time the photographs were taken or, more typically, to increasing their contrast against the background sky.

Photomontages are prepared with a 60° field of view, which follows the parameters of human vision. Wider panoramas are also used to indicate the full extent of the proposed solar farm facilities where appropriate.

2.7.4 GPS Coordinates and distance to the solar farm

The Nikon D850 camera also records the GPS coordinates as part of the metadata. GPS coordinates are also taken based on a separate hand-held GPS and the locations from which the photographs were taken is also marked on a digital map at the location of each photograph.

2.7.5 Photomontages

Two photomontages have been prepared from publicly accessible viewpoints to assist with understand the change in views from locations to the south of the Project. These photomontages are indicative of the views from the road network within the viewshed. The photomontages are appended to this report (Refer Annex A for A3 size photomontages with a 60° field of view).

It is recognised that the small photographs and the A3 photomontages included within this assessment are not indicative of the actual visual impact, however they are clearer than the smaller images in the text.

For a greater sense of perceptual accuracy, it is recommended that the 60° images be printed and viewed on A0 sized sheets and held at arms' length at the original location. When viewed at A0 the photomontages are representative of the level of visual alteration.

3. Project Description

From the outset, the Proposal has adopted a methodology to avoid or reduce impacts wherever possible. This includes the siting and design of key project infrastructure such as the sub-station, extent and location of the solar array, position of the maintenance facility and undergrounding of cabling and grind connecting infrastructure wherever practicable. A detailed description of the siting and design evolution is provided in the EES report.

The section provides detail on the key components of the Project relevant to views and visual impact.

The proposal seeks to develop a 29.9 MW solar farm approximately 12.0 km south east of Armidale in NSW (the Project).

3.1 Subject Site

The Project is located at 597 Gara Road, Metz in an agricultural area approximately 12.0 km south east of Armidale, NSW. The Project site is approximately 91 Ha.

Features and main roads in proximity to the project include the Gara River and Oxley Wild Rivers National Park to the east, Imbota Nature Reserve to the west and the Armidale waste transfer station to the north.

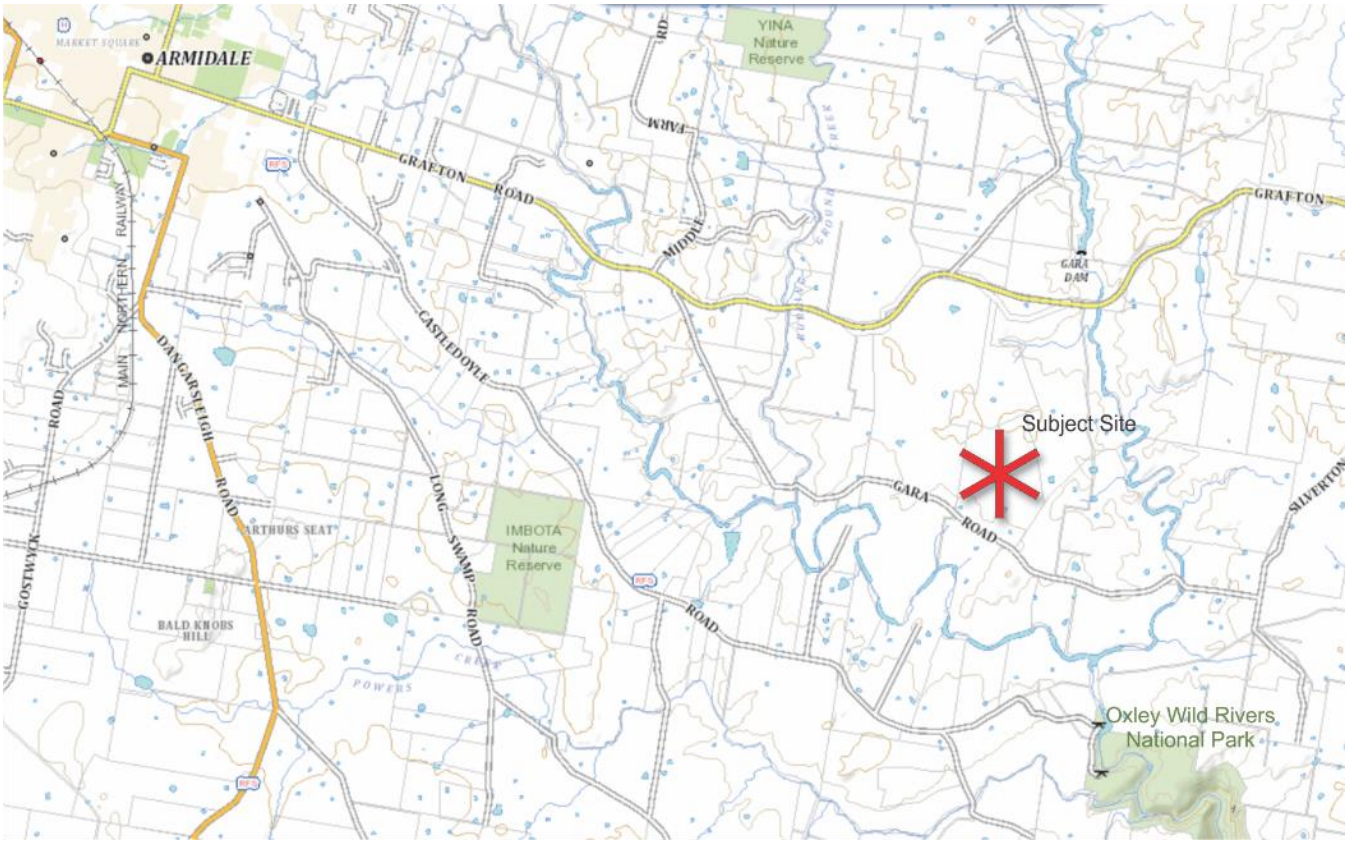


Figure 3-1 Locality Plan – (Source: Six Maps)

Grafton Road to the north is the only major road in proximity to the Project.

The Project's boundaries are shared with Gara Road to the south, and rural properties to the west and east and the Armidale waste transfer station to the north. Site access is from Gara Road to the south.

The site falls generally south west from approximately 1000 m AHD to the north to a low point of approximately 940 m AHD along Gara Road to the east of the site entrance.

Figure 3-2 shows the Lot boundary (Lot 3, Plan DP1206469) within which the Project is located and key features relevant to this assessment. The Project boundary is a smaller area and is shown in Figure 3-6.

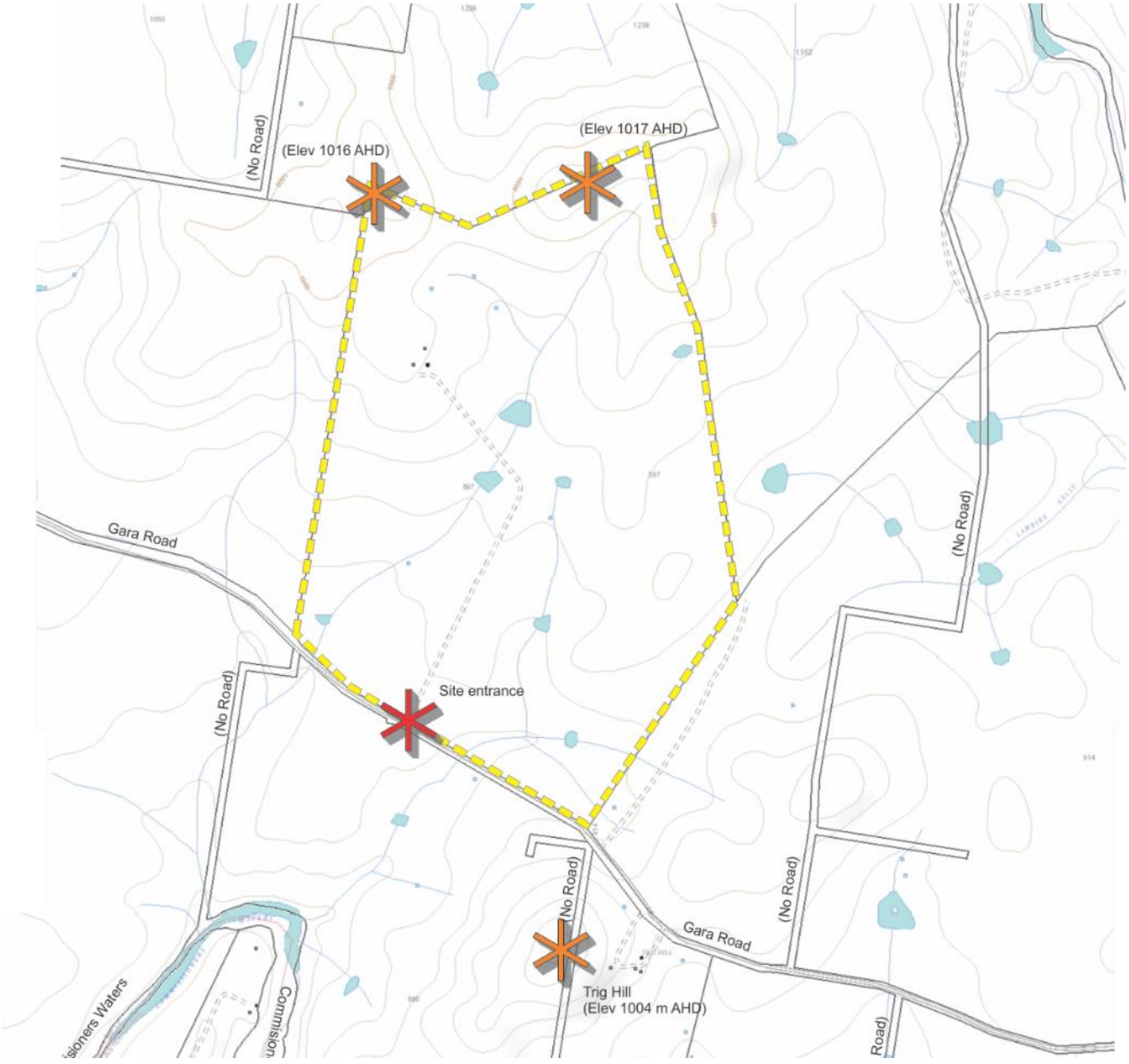


Figure 3-2 Subject Site - (Source: Six maps)

Trig Hill, which also has an elevation of approximately 1000 m AHD is an elevated location to the south of Gara Road and south east of the site.

Figure 3-3 below shows the subject site looking north from Gara Road adjacent to the existing property entrance.

Figure 3-3 View to the site from existing property entrance at Gara Road

The majority of the broader site area and project area is currently cleared and used for grazing purposes. Remnant vegetation is located on the elevated areas to the north of the site and can be seen in the background of the view.

Figure 3-4 below shows view looking south near to the northern most edge of the proposed solar panels.

Figure 3-4 View across site from the northern boundary, looking south

The existing dwelling near to the north-western corner of the site can be seen in the right of this view. Trig Hill to the south east of the site is visible to the left of the image.

Existing 132 kV transmission lines run along the northern site boundary and to the north of the Project boundary Figure 3-5 shows the view looking west along the existing transmission line to the north of the area of the proposed solar panels.

Figure 3-5 Existing transmission line

Figure 3-5 also shows the eastern elevation the existing dwelling, sheds, power lines and remnant vegetation which are within the site boundary, they are to the north of the Project area and will be retained in views external to the site. All of which are all taller than the proposed solar panels and ancillary project infrastructure.

3.2 Project Infrastructure

The Proposal involves the installation of PV panels with a nameplate capacity of 29.9 MW and associated infrastructure necessary for the operation of a solar farm.

The Proponent has sought to minimise the visual impact of the Project by locating all infrastructure that is not required within the solar array to areas of limited or reduced visibility. This includes the sub-station being located on the northern side of the elevated range, positioning the operations and maintenance building low on the site and undergrounding of powerlines wherever practicable.

A summary of the proposal relevant to the assessment of landscape visual impacts includes:

- PV panels mounted on a single axis tracking system with a height of 4 m above natural ground at maximum tilt;
- Approximately 12 inverters (up to 3 m high) located at least 50 m from any external boundary;
- On or below ground cabling connecting the PV panels to and between inverters;
- Operations compound (area 60 m x 60 m), including buildings with a maximum height of 5 m and car parking for up to eight (8) vehicles;
- A fire track 4 m wide, located within a 10 m defendable firebreak area around the perimeter of the Development Envelope;
- A dedicated water tank for firefighting (4 m high);
- Four (4) emergency access points;
- A perimeter security fence up to 2.5 m high;
- Three (3) vegetation landscape screens, one 12 m wide and two 5 m wide (maintained to be at least 4 m high);
- Internal access tracks (4 m wide);
- Underground cabling to connect the development to the Substation set within a 2 m easement;
- Substation up to 8 m high connecting the Proposal to the national electricity grid (area 45 m x 100 m);
- A perimeter security fence up to 2.5 m high enclosing the Substation;

- A 10 m defendable firebreak area around the perimeter of the Substation;
- One (1) emergency access point at the Substation; and
- One (1) vegetation landscape screen at the substation, 10 m wide.

The final location of the rows of solar panels, inverters and associated cabling within the Array Area will not be determined until a post consent design and tendering process has been conducted.

In addition to the key components outlined above, there will be a temporary construction compound required to facilitate the construction and decommissioning phases of the Proposal. The construction compound would include:

- Temporary construction offices;
- Car and bus parking areas;
- Staff amenity block including portable toilets, showers and a kitchen and designed for peak staff numbers during the construction period; and
- Laydown areas.

Once the development is operational, the construction compound will be decommissioned and restored to its current condition.

3.3 Photovoltaic Panels

The largest component of the Project will be the solar array. Each panel will be approximately 2.0 m x 1.0 m and mounted on a single-axis tracking system to form a “row” of panels arranged in blocks. At full tilt, the panels will have a maximum height of 4.0m.

Individual panels are mounted on a supporting frame and central tracking arm that orients the panels towards the sun throughout the day. Figure 3-6 shows the area of proposed solar panels in the hatched purple area. The solid red outline shows the site boundary.

Figure 3-6 Panel Layout and Site Boundary - (Source: Stringybark Solar Farm Pty Ltd)

The area of proposed panels is 500 m to the south of the northern vegetated ridge line and below the existing residential dwelling and on-site dam.

The highest elevation of the proposed solar panels is approximately 980 AHD and adjacent to the dam to the north. The lowest elevation is approximately 950 m AHD near to the site entrance at Gara Road.

The panel rows will be aligned north – south, allowing the tracking system to orient each panel towards the sun throughout the day, from the east in the morning through to the west in the afternoon. After sunset the panels will “backtrack” to face east.

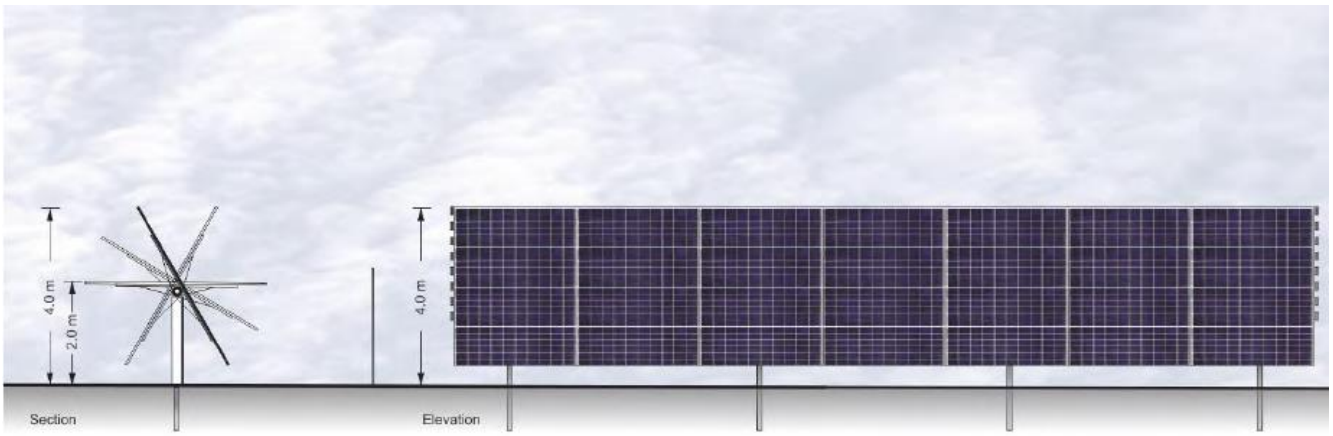


Figure 3-7 Typical single-axis tracking solar array

The operational rotation range of the tracking system is approximately 120 degrees from east to west depending on the system used. The maximum height of the PV panels above natural ground will be approximately 4.0 m at the beginning and end of the day.

3.4 Inverters

Inverters convert Direct Current (DC) electricity generated by the solar panels to Alternating Current (AC) for distribution.

Inverters are typically housed in containers similar in size to a 40ft shipping container measuring approximately 20.0 m (L) x 3.0 m (H) x 3.0 m (W).

Figure 3-8: Indicative Double Inverter Unit

The inverters will be visually similar to a shipping container when viewed from locations beyond the site and generally distributed within the panel array. Approximately 12 inverters are proposed across the array area all of which are to be situated at least 50m from any site boundary and within the solar array.

3.5 Substation

The proposed substation will be located to the north west of the project area and within a new facility to the north of the elevated range. The proposed sub-station location was established to reduce the visual impact of the project. The Project will connect to the substation via a new underground cable that will run through cleared farmland.

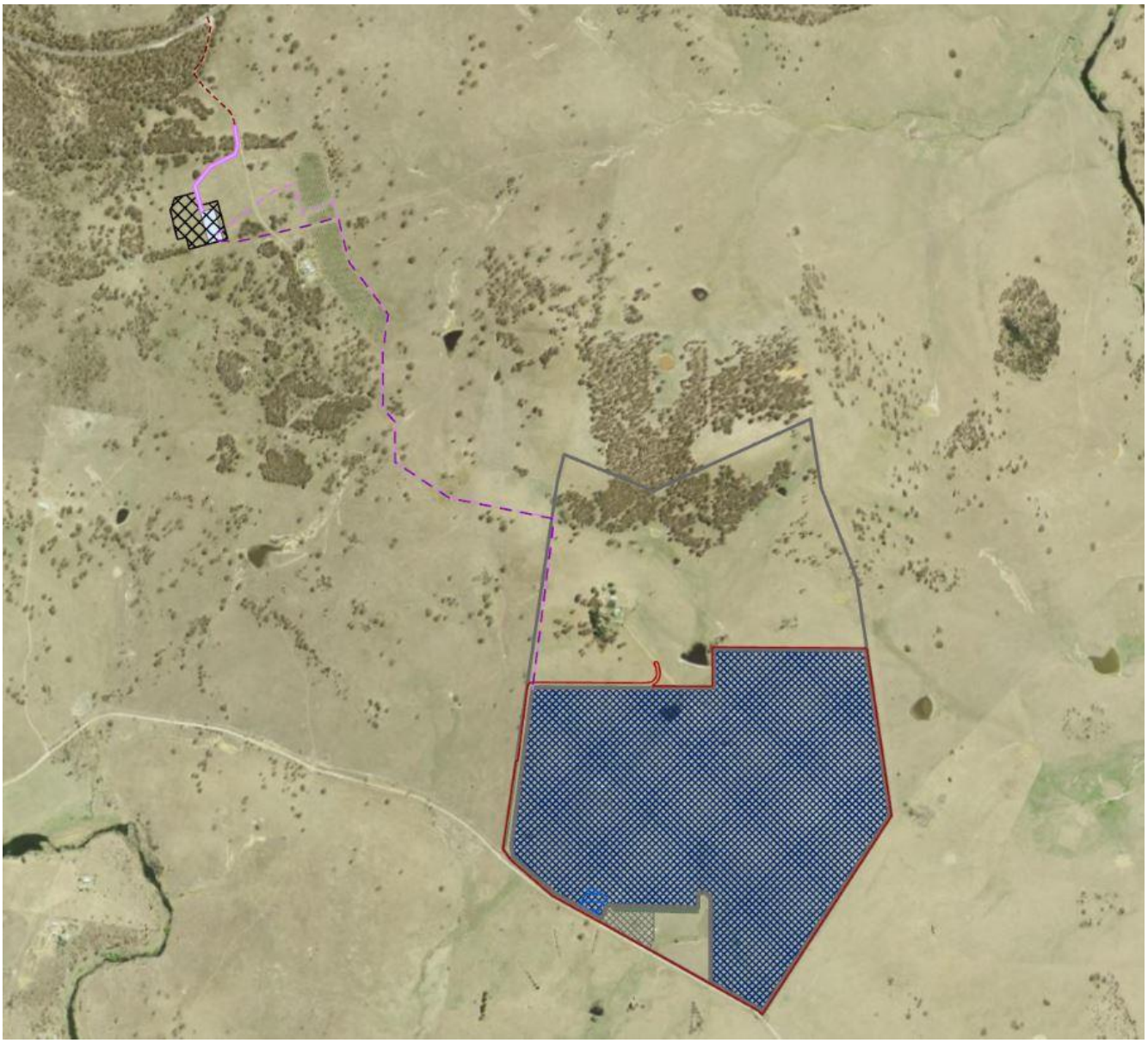


Figure 3-9 Proposed substation location - (Source Stringybark Solar Farm Pty Ltd)

The proposed transmission line route, shown in grey, has been designed to avoid the need to remove native vegetation on the elevated ridge and scattered trees.

The final design specifications of the substation will be subject to a grid connection agreement. The substation is likely to contain the following key components:

- A transformer;
- High voltage (HV) circuit breakers and switch gear;
- Circuit Breakers;
- Disconnectors;
- Current and Voltage Transformers;

- Switch room;
- 10m Fire Break around infrastructure; and
- Perimeter fencing.

Figure 3-10 shows a typical constructed substation (left) and the proposed substation location (right)

Figure 3-10 Typical substation

The proposed sub-station location is set back from Grafton Road amongst stands of native trees and to the west of an olive grove plantation.

Figure 3-11 below shows the view looking south west from Grafton Road looking towards the proposed substation location.

Figure 3-11 View looking south west from Grafton Road

The proposed substation would be located behind the existing vegetation and low rise seen in the background of the view. This vegetation, which is proposed to be retained will screen views to the substation from Grafton Road.

3.6 Perimeter fencing

Security fencing, up to 2.5m in height, is proposed for the perimeter of the Project boundary. Where practicable, perimeter fencing will be set back from the site boundary and behind proposed landscape screening.

3.7 Construction

The construction period is likely to be 9 months. This period will be dependent on weather and ground conditions. Construction activities that have the potential to contribute to a landscape and/or visual impact, are likely to include the following:

- Temporary construction compound;
- Internal access tracks;
- Substation and grid connection networks;
- Excavation of trenches and the laying of power and instrumentation cables;
- Erecting the panels and supporting infrastructure; and
- Vehicular traffic.

The temporary soil stockpiles, construction compound and hardstand areas would be rehabilitated and landscaped at the end of the construction period.

3.8 Relevance to establishing the Viewshed

The largest visual change brought about by the Project will be the proposed solar array and associated inverters. Although the proposed panels will have an overall height of 4.0 m above natural ground, the elevation change across the proposed panel area will be approximately 30 m from the northern edge of the solar array to southern edge at Gara Road. The change in grade across solar array will allow greater visibility of solar array as the panels cascade down the slope as opposed to a solar array on a site with gentler topography. Therefore, it is a combination of the change in level across the solar array with the overall panel height that will contribute to a change in views from areas beyond the site.

To be, conservative the viewshed and zones of visual influence will be determined based on an overall 35.0 m which allows for the site topography, minor topographical change within the site.

4. Seen Area Analysis

This section establishes a rational basis on which to determine the extent of the viewshed or study area for the assessment of the visual impact of the Project. Zones of Visual Influence will also be established to consider the scale of the project in views from various distances removed from the site boundary.

The viewshed defines the area or distance from the Project where the key features may be a recognisable element within a view. This distance is established based on the height of the key project features determined in Section 3.0 and the parameters of the human vision which are described below. It may be possible to see the proposed solar panels from areas beyond the viewshed, however the solar array would be a barely noticeable element in the view and would therefore not bring about and appreciable change in views.

Typically, the extent of the viewshed is calculated based on the overall height of the tallest project component rather than its width. This is because the taller the object, generally the greater the distance that the object would be more noticeable from. The width of the project or area is contemplated by the horizontal offset of the viewshed and zones of visual influence from the project features.

The parameters of human vision include the vertical and horizontal fields of views as shown in Figure 2-1**.** These figures are based on data from '*Human Dimension and Interior Space'*, *Julius Panero & Martin Zellnik, Witney Library of Design,1979*. Similar data can be found in the more recent publication entitled '*The Measure of Man and Woman, Revised Edition', Henry Dreyfuss Associates, John Whiley & Sons, 2012*.

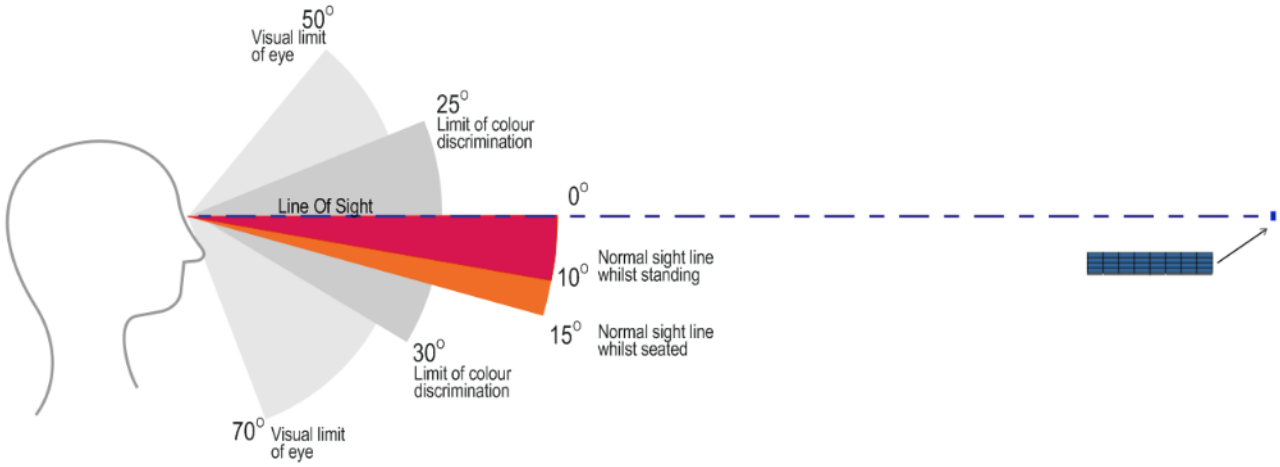


Figure 4-1 Determining the viewshed extent based on project infrastructure within the vertical field of view

The theoretical extent of the viewshed can be considered to extend to a distance at which the tallest component of the Project would take up less than 5% of the vertical field of view. Typically, the field of view of a person is 10°, whereby 5% of the vertical field of view is approximately equal to 0.5°.

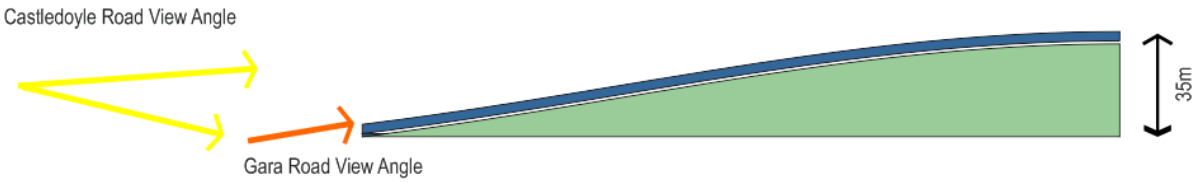
The distance at which a 35 m object in the landscape would take up 5% (0.5°) of the vertical field of view is 4.0 km.

4.1 Zones of Visual Influence

The Zones of visual influence assist to consider visibility and visual prominence of the Project over various distances. The further away a viewer is from a project, the less obvious or noticeable the project will be in

views, conversely, the closer a viewer or viewing location is the more noticeable the project will be. Zones of Visual Influence (ZVI) quantifies the effect of distance for the visibility of Project infrastructure within the established viewshed for inclusion in the assessment of the overall visual impact from each viewpoint.

For example, when a view location is closer to a panel, the panels would take up a greater percentage of the vertical field of view. This calculation does not take into account view angle form locations such as Gara Road which would look up slope and therefore reduce the angle of incidence.



The ZVI's and visual significance are described in Table 4.1.

Table 4.1 Zones of Visual Influence

Distance to Solar Panel	Vertical angle of view	Zones of Visual Influence
>4.0km	<0.5	**Visually insignificant** – Extent of the Project viewshed A very small element in the viewshed, which is difficult to discern and will be invisible in some lighting or weather circumstances.
2.0-4.0km	0.5-1.0	**Potentially noticeable**, but will not dominate the landscape The degree of visual intrusion will depend on the landscape sensitivity and the sensitivity of the viewer; however, the Project will not dominate the landscape.
800 m -2.0 km	1.0-2.5	**Potentially noticeable and can dominate the landscape** The degree of visual intrusion will depend on the landscape sensitivity and the sensitivity of the viewer.
500 m-800 m	2.5-5.0	**Highly visible and will usually dominate the landscape** The degree of visual intrusion will depend on the Project in views from the landscape and factors such as foreground screening.
<500 m	>5.0	**Will always be visually dominant in the landscape** Dominates the landscape in which they are sited.

It is recognised that project and panel visibility will not dramatically alter when a viewer moves from 490 m to 510 m from the nearest project feature, and therefore these zones are a guide only.

Areas that have the potential to be most visually affected by the proposed panels are those within 400 m of the nearest project boundary, while areas that may have potentially noticeable visual impacts associated with the Project extend out to 2.0 km from the nearest boundary. This will be dependent on actual visibility of the proposed panel area afforded by topography, vegetation and other structures.

The landscape within the 4.0 km viewshed of the Project will be reviewed to:

- Determine the landscape character, the types of landscape units that occur within this viewshed; and
- Assess the visual impact from indicative viewpoints.

4.2 Seen Area Analysis

The Seen Area Analysis (SAA) or visibility mapping identifies locations that may have views to the project. The SAA is a theoretical model that is based on the physical characteristics of key project infrastructure and the topography of the surrounding landscape. The SAA does not include features that are typically found in the landscape such as vegetation, cultural plantings, buildings and structures that might assist to screen or filter views.

The SAA provides a conservative basis from which to select a range of representative viewpoints to understand the range and scale of the overall visual impacts that might be brought about by the Project.

The Project is located within a hilly landscape on the northern side of Commissioners Waters to the south and an elevated range to the north. Elevation change across the area of proposed panels is approximately 30 m from north to south. Local rises, depressions and gullies can screen views to part or the entire Project.

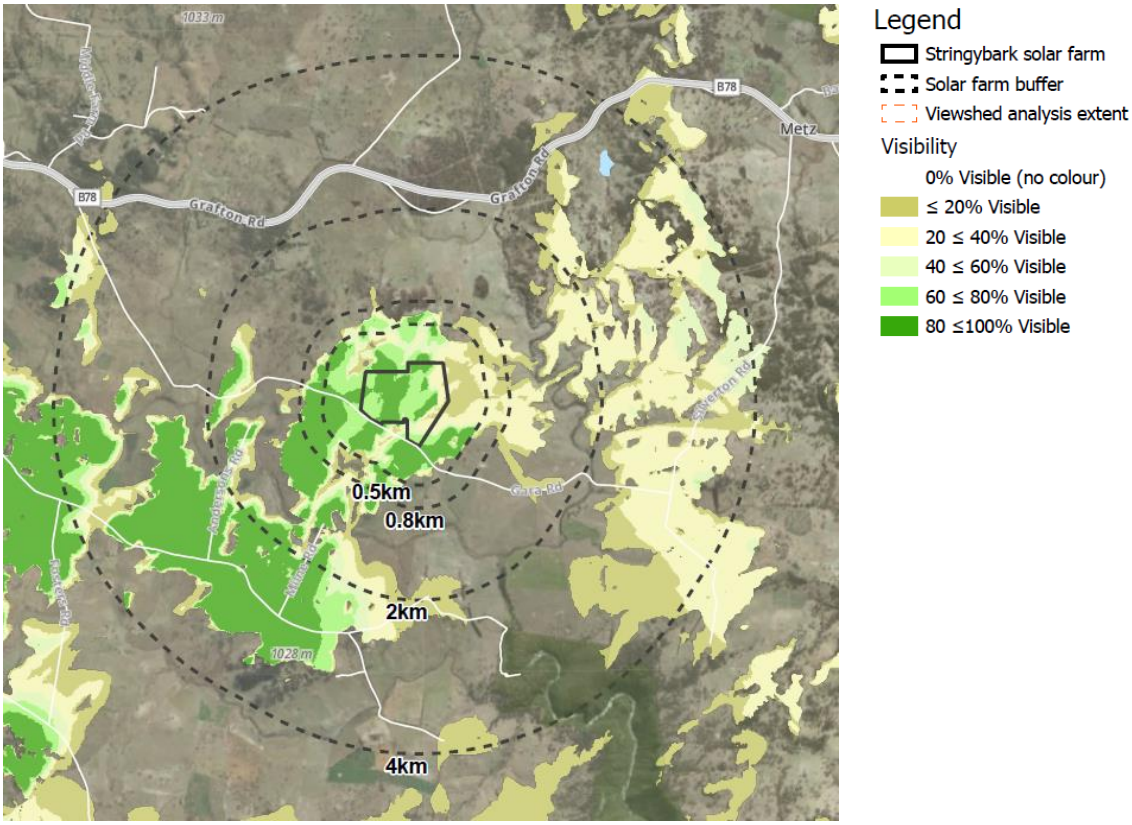


Figure 4-2 Seen Area Analysis (Theoretical Visibility)

Project visibility is generally to the south and south west of the Project. Views from locations to the north are screened by the elevated ridge along the site's northern boundary. Nearby views to the south of the site are generally confined to the area between Castledoyle Road and the elevated ridge to the north of the site.

4.3 Relevance of this analysis to visual assessment

Examining theoretical project visibility (in whole or part) assists to identify locations from the area surrounding the Project from which to assess the potential for visual impacts.

The theoretical visibility map shows that the areas with the greatest potential to see the project include:

- The areas adjacent to Milne and Andersons Road;
- Castledoyle Road; and
- Gara Road.

Visibility along Gara Road is limited to a relatively short section immediately south of the site, while visibility from Castledoyle Road is from the area generally between Blue Hole Road to the east and Fosters Road to the west. It is possible for the project to be visible from the majority of Andersons and Milne Road. These roads are local roads truncated at their northern ends near to Commissioners Waters.

The views from these areas will be assessed in a selection of views from publicly accessible location along the surrounding road network.

5. Planning Policy Framework

This chapter will describe the relevant planning provisions applicable to the proposal and the surrounding area for the purposes assessing the landscape and visual impacts of the Project.

This is not intended to be a thorough review of the planning scheme, mechanisms and triggers as this is best undertaken by others. Rather this review seeks to identify areas or locations that may be of a particular landscape or visual significance when compared to other landscapes in the region and recongnised or protected accordingly.

5.1 State Environment Planning Policy

The State Environmental Planning Policy (Infrastructure) 2007 (SEPP) states that the development of a solar energy system may be carried out by any person with consent on any land (*Clause 34.7: Development permitted with consent*) other than in a prescribed residential zone if the system has the capacity to generate more than 100kW. The anticipated generating capacity of the Stringybark Solar Farm is approximately 29.9 MW.

The subject site and the majority of the surrounding area is entirely within prescribed rural zones which include RU1 Primary Production and Rural Use 4 Zone – Primary Production Small Lots.

5.2 State legislation

5.2.1 Environmental Planning and Assessment Act 1979

Development in NSW is subject to the requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and its associated regulations and planning instruments. Part 4 of the EP&A Act addresses developments requiring consent as indicated by an environmental planning instrument. The Project to be assessed under Part 4 of the EP&A Act.

5.3 Armidale Dumaresq Local Environment Plan 2012

The entirety of the subject site sits within the Armidale Dumaresq Local Environment Plan (LEP).

5.4 Zones

Planning zones describe permissible uses, identify areas of sensitivity and protect features that are special or unique to an area.

Unique landscapes may be recognised by Environmental Zones for their scenic qualities, remnant vegetation or specific environmental qualities and provide guidance on how these areas might be protected. These areas are typically found within an Environmental Zone. Sensitive uses such as residential areas are also recognised by the planning scheme and seek to protect these areas against incompatible uses or development that may bring about adverse amenity impacts.

Planning provisions also recognise areas and uses, such as farming practices, that may have the potential for offsite amenity impacts such as odor, noise, dust or visual. The planning provisions for these areas also put in place protections to enable the continued use of those areas and protect them from encroachment and incompatible uses.

Figure 5-1 shows the site boundary and the planning zones within the identified project viewshed.

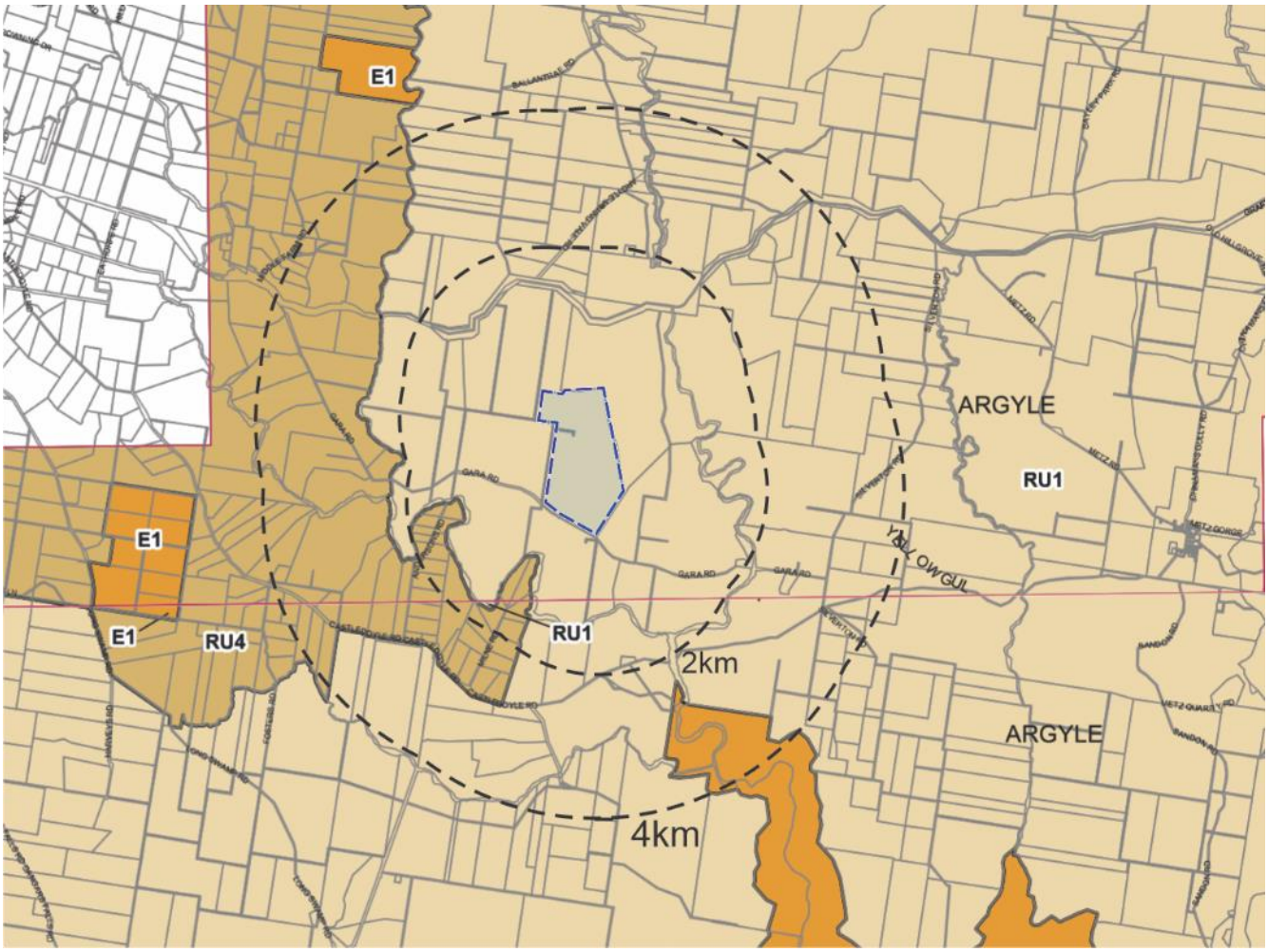


Figure 5-1 Land Zoning Map. Source: Armidale Dumaresq LEP, Land Zoning Map - Sheet LZN_002 & Sheet LZN_003

The site and the majority of the surrounding area is within the Rural Use 1 Zone – Primary Production (RU1). Areas to the west of burying ground creek and south and west of Commissioners Waters and nearer to Armidale are zoned Rural Use Zone 4 – Primary Production Small Lots (RU4). This includes the areas around Anderson and Milne Road which include several residential properties.

RU4 Primary Production Small Lots is by definition land that is set aside for farming uses. There tend to be a greater number of residential dwellings in these farming areas due to the smaller lot sizes when compared to farming properties found in the RU1 Zone. Although there is the potential for a greater number of residential dwellings in the RU4 Zone, the use and sensitivities of the area within this zone is not to be confused with the greater sensitivity of the land with the zone R5 Large Lot Residential which is typically attributed to rural residential areas. Areas set aside for the purposes of primary production are also considered as areas that will have some off-site amenity impacts.

Oxley Wild Rivers National Park to the south west and the Imbota Nature Reserve to the west are zoned Environmental Zone 1 (E1).

Objectives of the RU1 Zone – Primary Production are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To allow for non-agricultural land uses that will not restrict the use of other land in the locality for agricultural purposes.*

These objectives recognise the potential for off-site amenity impacts of land use in this zone as long the impacts would not impede or restrict other agricultural uses in proximity to the site. These objectives recognise the potential for off-site amenity impacts through the use and management of these areas but allow for alternative uses, that will not impede or restrict other agricultural uses in proximity to the site.

The objectives of the Rural Use 4 Zone – Primary Production Small Lots are:

- *To enable sustainable primary industry and other compatible land uses.*
- *To encourage and promote diversity and employment opportunities in relation to primary industry enterprises; particularly those that require smaller lots or that are more intensive in nature.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

Similar to the RU1 zone, the objectives of this zone seek to allow for a range of uses within the zone that do not necessarily include agriculture and primary production subject to the compatibility of these uses with adjoining zones.

Over time, larger farming properties nearer to urban centres such as Armidale are sub-divided into smaller rural allotments. These areas are typically zoned as either R5 Large Lot Residential that seek *to provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality* or RU4 Primary Production Small Lots such as those areas around Andersons and Milnes Road. This later zone (RU4) is a zone which contemplates farming practices which have the potential to bring about off-site amenity impacts and are inherently less sensitive.

The fragmentation of historically larger farms into smaller allotments increases the potential density of residential dwellings in an area, the act of subdivision itself is a catalyst for a change in landscape character. That is, a transition of an area from large rural properties with few dwellings, structures and roads, to one that include increasing density of dwellings, structures and roads which are also visible from the surrounding landscape. These changes also bring with them an increase in activity and lights in night time views.

This transition suggests that the rural areas are capable of a change in character; in fact they are constantly changing both on a seasonal basis through cropping and grazing but in a longer term and more permanent basis.

The objectives of the E1 Zone are:

- *To enable the management and appropriate use of land that is reserved under the National Parks and Wildlife Act 1974 or that is acquired under Part 11 of that Act.*
- *To enable uses authorised under the National Parks and Wildlife Act 1974.*
- *To identify land that is to be reserved under the National Parks and Wildlife Act 1974 and to protect the environmental significance of that land.*

This zone seeks to protect the natural and environmental qualities of the area over which they apply.

6. Landscape Character and Sensitivity

Landscape character is defined by areas with similar visual characteristics in terms of topography and geological features such as creeks and drainages lines, vegetation and land use. Landscape Character and its sensitivity to visual change is also supported by the various zones and provisions within the planning scheme.

This section will describe the landscape character within the viewshed of the Project.

6.1 Topography

The subject site and the surrounding area can be characterised as being of a gently undulating landscape that is punctuated by local rises and rocky outcrops such as Mt Trigg to the south west of the site.

The site is located on the northern side of a local basin bisected by Commissioners Waters.

The Project site is generally south facing and slopes upward from Gara Road toward a local ridgeline situated along the site's northern boundary.

There are small sections of localised eroded gullies within the south east of the site and the Project area.

6.2 Vegetation

The majority of remnant vegetation is located along the elevated ridgelines and beside creeks, water ways and streams. Planted vegetation is typically located along property boundaries and around residential dwellings.

A large portion of the subject site and the surrounding areas have been cleared between the elevated ridge lines and local creeks and waters.

Cleared areas tend to comprise higher quality soils, gentler topography or both and have been historically more suited to agricultural purposes. These cleared areas are usually the lower lying plains between hills and ridges. Areas of retained vegetation are usually locations of poorer quality or shallower soils and steeper topography.

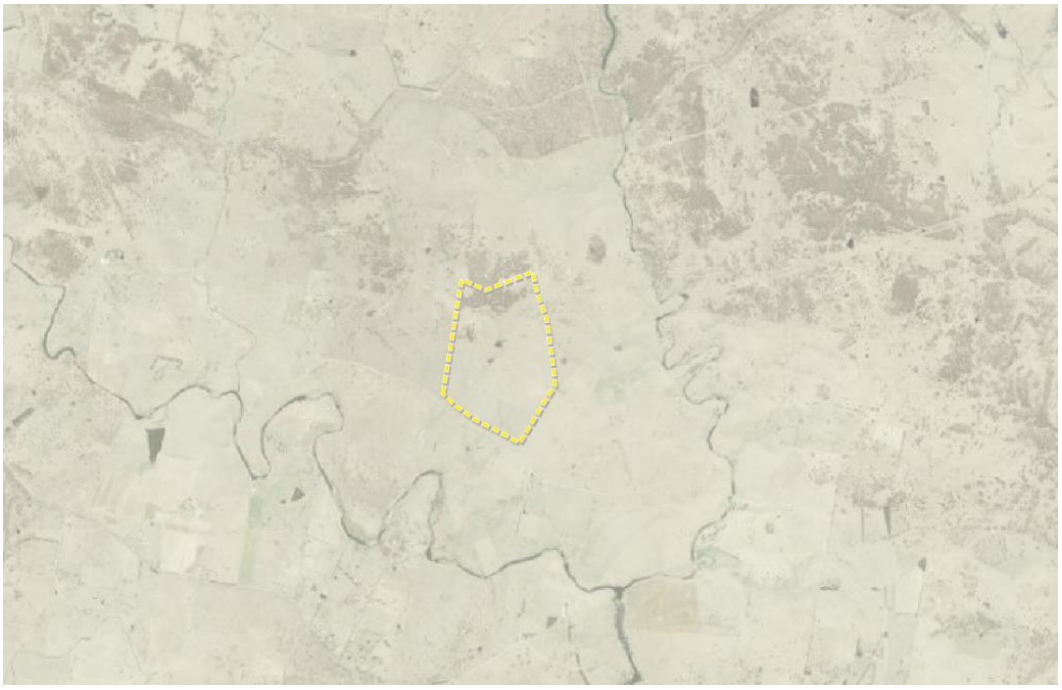


Figure 6-1 Existing Vegetation (Image Source - SIX Maps)

This is evidenced by the vegetation retained on the steeper areas of the Great Dividing Range and the more disturbed areas to the east of the Project. Existing easements created for water pipelines and transmissions are more noticeable where they cross through vegetated areas.

There are also areas of retained or planted vegetation in linear bands along streams, drainage lines and road sides.

6.3 Land Use

The majority of the area within the Project viewshed is zoned as either RU1 or RU4 and is used for agricultural or farming purposes accordingly. This land use is typically not one that is sensitive to visual change. It is also a land-use that contemplates a level of off-site impacts to amenity through its ongoing use. These land uses are reflected in the zoning maps seen at Figure 5-1.

Based on the above there are three clear landscape character types that can be derived based on a description of topography, vegetation, land-use and zoning as follows:

- Landscape unit 1 - Cleared Undulating Farmland
- Landscape unit 2 - Vegetated Areas; and
- Landscape unit 3 - Small lot Farming areas

The Gara Falls Reserve and Oxley Wild Rivers National Park is approximately 3.5 km to the south east of the Project. This area which is zoned E1 is demonstrated to have no visibility of the Project within the Seen Area Analysis.

6.4 Landscape sensitivity

Landscape sensitivity is in part a measure of the ability of a landscape to absorb visual change based on the attributes of a particular landscape. The sensitivity of the previously described landscape units will depend upon a number of attributes, such as:

- **Location.** A location such as a National Park or forest where the landscape appears untouched or pristine will be more sensitive to the imposition of new or artificial elements within that landscape than a view along a rural highway, over a landscape which is highly modified and contains existing examples of modifications and artificial elements. Modifications or artificial elements are not confined to structures or built form, they also include removal of native vegetation; visibility of roads, tracks, fences and other rural infrastructure all of which modify the sensitivity of a landscape to further change.
- **The rarity of a particular landscape.** Landscapes that are considered rare or threatened are valued more highly by viewers.
- **The scenic qualities of a particular landscape.** Landscapes that are considered scenic are also those that are considered sensitive. They often contain dramatic topographical changes, the presence of water, coastlines, and other comparable features. The presence of modifications or artificial elements (including built form, roads, tracks, fences, and silos), as well as farming practices including land clearing, cropping and burning can decrease the sensitivity of a landscape's scenic qualities.

The landscape within the study area includes largely cleared undulating farmland, with residential dwellings and native vegetation typically confined to elevated ridges and creek lines.

The landscape sensitivity of the Cleared Undulating Farmland Landscape Unit is considered low. It is not a rare or threatened land-use or character and common across a large area of New South Wales and the area around Armidale. This landscape unit regularly changes both seasonally and progressively through fragmentation or sub-division. Rural activities such as grazing, crop cycles, construction of buildings and other changes associated with farming and agriculture are constant reminders of human influence on the landscape.

It is recognised that some people value the cleared farmland with minimal constructed elements such as houses or farm sheds, however these views and the use of the land is not protected or specifically preserved for the use and enjoyment of others. The presence of solar arrays may be perceived as a high visual impact due to the presence of structures on an area that has historically been viewed as pasture or crops, however these landscapes are already highly modified by human activity.

The landscape sensitivity of the Vegetated Areas Landscape Unit is considered medium to high as it appears to be natural and somewhat unmodified.

Small lot farming land is largely similar that of the Cleared Undulating Farmland albeit with a greater intensity of built form, sheds and other structures.

Table 6.1 rates the sensitivity of the various landscape units within the viewshed of the Stringybark Solar Farm.

Table 6.1: Landscape Units

Landscape Unit	Sensitivity
Unit 1 – Cleared Undulating Farmland	**Low - –** Highly modified, by way of clearing of native vegetation. The intersection of rolling hills and incised valleys provides for a diversity of framing of views that are either closed and confined or reveal longer views across the landscape. This landscape type is the largest use and zone by area in the region and is therefore not one that is rare, threatened or naturally appearing.
Unit 2 – Vegetated Areas	**Medium** – This landscape is attractive as it contains areas that appear natural. Views from within the boundaries of these areas tend to screened or filtered by existing vegetation.
Unit 3 – Small Lot Farmland	**Low – Medium -** These areas contain smaller, cleared blocks which are set aside for the purpose of farming and primary production. This landscape generally contains more vegetation (within gardens, scattered within lots or planted shelterbelts) and a greater density of built form, including dwellings and sheds, than the cleared hilly farmland landscape. Although highly modified, the presence of residential dwellings increases the landscape sensitivity.

These landscape sensitivity ratings will be used to assess the visual impact of views from publicly accessible locations within the viewshed.

Landscape sensitivity from individual residential properties will always be assessed as “high” as for a resident, their home will always be a highly sensitive location and disturbances to a resident’s views must always be considered to have the highest degree of sensitivity.

7. Community

7.1 Community Consultation

Stringy Bark Solar Farm Pty Ltd have undertaken several rounds of community consultation which have resulted in several structural changes to the Project.

The first round of community consultation was held on the 22nd May 2019 at the Armidale Bowling Club. All identified residential dwellings within 2.0 km of the project were notified by letter.

Following the first round of community consultation the project was modified to reduce the overall project footprint, alter the location of the maintenance and operations buildings from the higher elevations of the Project area to a location adjacent to the Gara Road entrance, locate the substation offsite in an area where it can be screened from views, underground the grid connection power line and the inclusion of landscape screening along key interfaces.

The Project extended the offer for a specific site visit for the purposes of assessing the views from their dwelling, which was taken up by five (5) of the dwellings in the area. Views from these dwellings were captured during the site visit that forms the basis of this assessment. These dwellings are discussed in Section 11 of this report.

A second round of Community consultation was undertaken on July 25th also at the Armidale Bowling Club. The modified project was presented and discussed through plan graphics and photomontages from Milne and Castledoyle Road.

A theme that emerged through both rounds of community consultation was the potential visual impact from the residential dwellings in proximity to the project.

7.2 Community Perception Studies

The visual impact of a project is largely dependent on the opinion or reaction of the individual viewer to a view. Community perception studies provide one method to statistically validate the perceptions of the broader community and their attitude towards a project.

The presence of renewable energy projects will change some perceptions of the landscape character of a locality. However, to assume that the introduction of a solar farm to a landscape will create irreversible damage to landscape values and negatively impact the amenity of the area is not substantiated in statistical data in community perception studies from Australia and overseas.

Recent studies undertaken by the NSW government and the Australian Renewable Energy Agency (ARENA) have been prepared to better understand community acceptance of renewable energy projects within NSW and nationally. National Studies that specifically respond to solar farms include the Australian Renewable Energy Agency (ARENA) *Establishing a Social License to Operate, IPSOS 2015* and the *Community Attitudes to Renewable Energy in NSW, 2015* commissioned by the NSW State Government Office of Environment and Heritage (OEH).

There are a several similar studies undertaken for wind farm developments through Australia and overseas. These studies have been prepared over a much greater time frame and with the benefit of greater understanding of the technology. This greater understanding enables more informed views to be provided by respondents to the similar studies.

It must be recognised however that wind farms differ significantly in terms of visual impact to that of a solar farm due to their vertical height having the potential for broader reaching visual effects. The link of these studies to

solar farm projects is the focus on renewable energy as an energy source in rural areas and perceptions towards these types of project.

7.2.1 ARENA

In 2015, the ARENA Commissioned ISPSOS to prepare the report *Establishing the social licence to operate large scale solar facilities in Australia: insights from social research for industry (*ARENA 2015) to provide best practice guidelines on community consultation regarding large scale solar developments.

The study found that there was widespread support for large scale solar energy facilities in Australia, with 78% of respondents indicating their support. This is similar the views expressed during community consultation for the Stringy Bark Solar Farm.

With regards to views and visual impact of large-scale solar facilities the initial reaction saw approximately 30% of respondents agreeing that that large-scale solar projects will have negative visual impacts while 28% disagreed. 31% of respondents neither agreed nor disagreed, indicating a lack of knowledge about the visual profile of large-scale solar facilities. The level of support for large scale solar projects increased after being shown a set of photographs of large-scale solar facilities, where the initial concern for negative visual impacts dropped from 30% to between 19-23%.

7.2.2 Office of Environment and Heritage

In 2015 the OEH commissioned the *Community Attitudes to Renewable Energy in NSW, 2015* [1]which included solar farms as part of the diversified renewable energy platform for NSW.

When asked the question regarding the acceptance of wind and solar farms within 1-2 kilometers of a dwellings, the response for solar farms received support in the order of 91%. The levels of support for wind and solar are shown in Figure 7-1.

[1] https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Energy-savings-and-resource-efficiency/community-attitudes-to-renewable-energy-nsw-150419.pdf

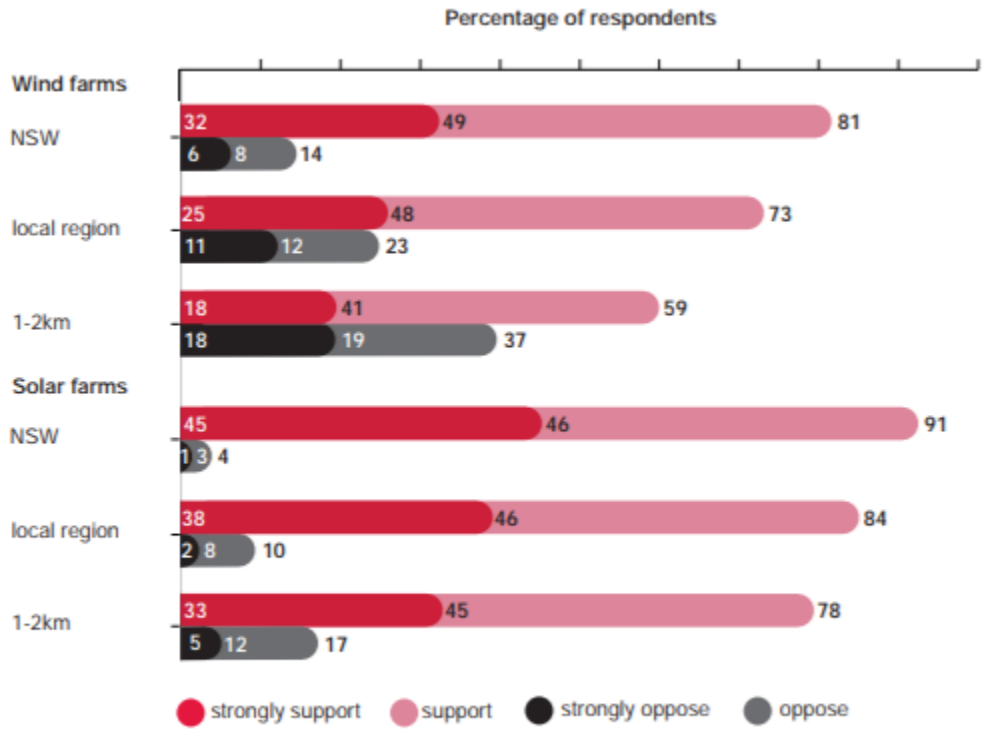


Figure 2.10: Support for and opposition to building a wind/solar farm in three proximities – in NSW, the local region, and within 1–2 kilometres of where they lived.

Figure 7-1 Reproduced from the *Community Attitudes to Renewable Energy in NSW, 2015 – Figure 2.10*

This study confirmed continual strong support seen in many preceding community perceptions studies in Australia and overseas for wind turbines within 1-2 kilometers of a dwelling.

Regional variations in attitudes to wind and solar farms were largely consistent across the non-metropolitan areas of NSW, however the North East region demonstrated higher levels of strong support for solar farms in the local region (44%) compared to other regions.

8. Scale of Effects

This section will describe the scale of effects used to determine the visual impacts of the project.

8.1 Publicly Accessible Locations

The scale of effects for determining the level of visual impact as a result of the project from publicly accessible locations may range from no impact (nil) to a potentially positive impact.

Nil – There is no perceptible visual change.

Negligible – A minute level of effect that is barely discernible over ordinary day-to-day effects. The assessment of a negligible level of visual impact is usually afforded where the project is at such a distance that it would be barely discernible or features within the landscape would screen or filter views.

Low – Where visual impacts are noticeable but will not cause any significant adverse impacts. The assessment of a 'low' level of visual impact may be reached if the rating of any of four criteria (visibility, distance, viewer numbers and landscape sensitivity) are assessed as 'low'.

Moderate – The assessment of a 'moderate' level of visual impact will be reached if all four criteria are rated higher than 'low'.

High or **unacceptable** adverse effect – Extensive adverse effects that cannot be avoided, remedied, mitigated or offset. The assessment of a 'high or unacceptable' level of visual impact from a publicly accessible location requires all four criteria to be rated as 'high'.

Positive – Is a change that improves the view.

The visual impact from residential dwellings applies the same scale of effects, however the assessment criteria to determine the overall visual impact assumes a high level of sensitivity and does not consider viewer numbers.

9. Publicly Accessible Viewpoints

This chapter will examine the visibility of the proposed solar farm from publicly accessible viewpoints.

Nine viewpoints have been selected from a range of locations around the project where the SAA indicated theoretical visibility of the Project.

There are no major roads within the area of theoretical visibility. Local Roads include Castledoyle Road which runs generally east – west to the south of Andersons and Milne Roads which run generally north – south and are truncated at the northern ends, and Gara Road which is a local gravel road that runs along the site's southern boundary.

These locations have been chosen to represent views from locations that were raised during community consultation or from locations where people are likely to view the project. Viewpoints are grouped into themes including views from tourist locations, main or local roads or from locations where visitors to the area may interact with the Project.

In addition to providing for the types of views that are likely to be afforded to the project, the selected views also provide an understanding of the nature of visibility of the project area with regard to distance and the features of the surrounding landscape.

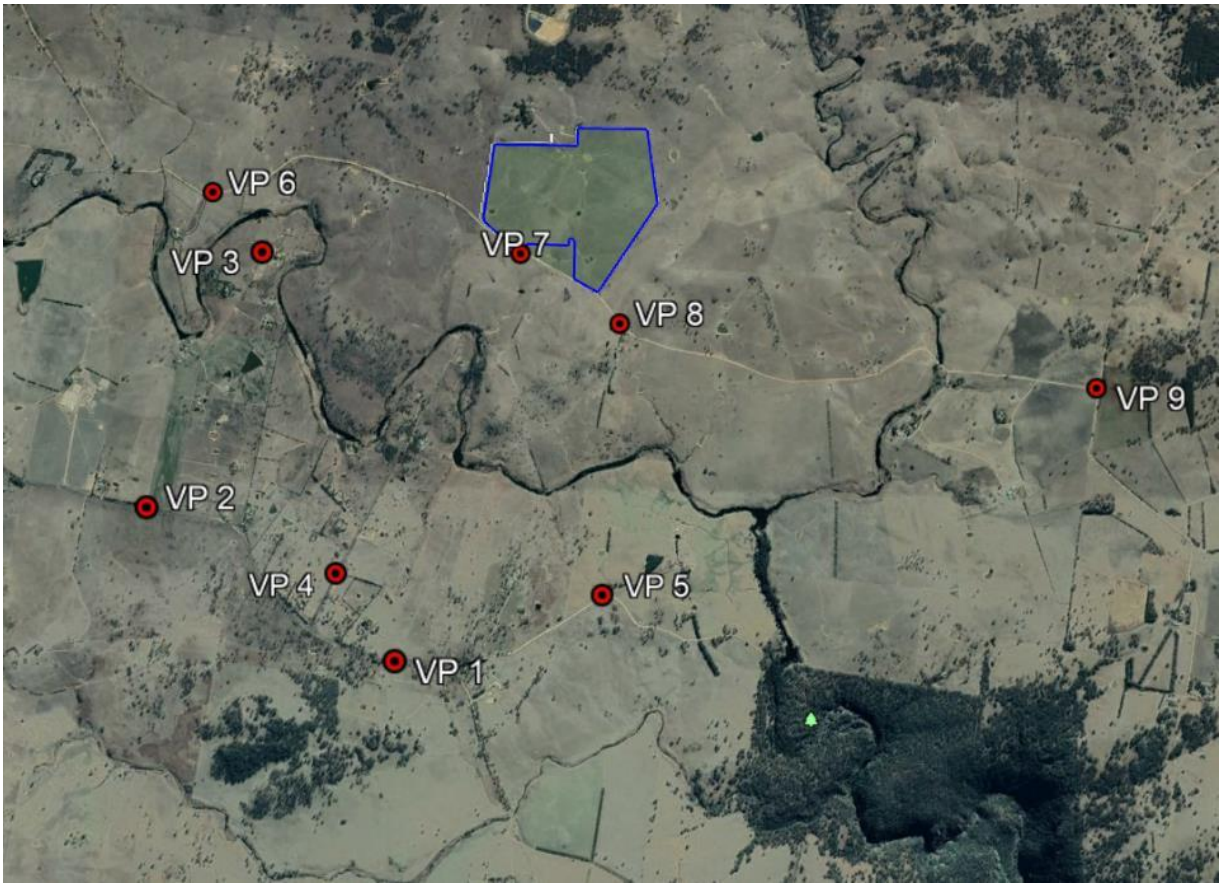


Figure 9-1 Viewpoint Locations

Two photomontages have been prepared from locations to the south of the project where viewers may be familiar with the area and therefore resonate with the likely change in views or where there are clear views to the project.

The first is from Milne Road which is oriented directly towards the project for road users travelling north. The second location is from Castledoyle Road to the south east of the Project.

Figure 9-2 Milne Road looking north

Figure 9-3 Castledoyle Road looking north west

These photomontages are shown to assist with understanding the context of views and visibility of the Project from other viewing locations. A3 copies of the photomontages are attached to this document within the appendices.

9.1 Local Road Viewpoints

9.1.1 Viewpoint 1 – Castledoyle / Blue Hole Road

This viewpoint is located along Castledoyle Road just west of its intersection with Blue Hole Road and the entrance to the Oxley Wilds National Park.

The nearest Project boundary and proposed solar panels are approximately 2.7 km to the north east.

Figure 9-4 shows the view looking north toward the project site.

Viewpoint coordinates: 56J 382408.00 m E, 6614605.00 m S

Figure 9-4 Castledoyle Road looking north

From this location there are clear open views to the north and the Project area over cleared farmland and the valley of Commissioners Waters. The Project and the proposed solar panels would be located on the cleared south facing slope seen in the background of this view.

Figure 9-5 shows the same view with the proposed solar panels and other project infrastructure super imposed into the view.

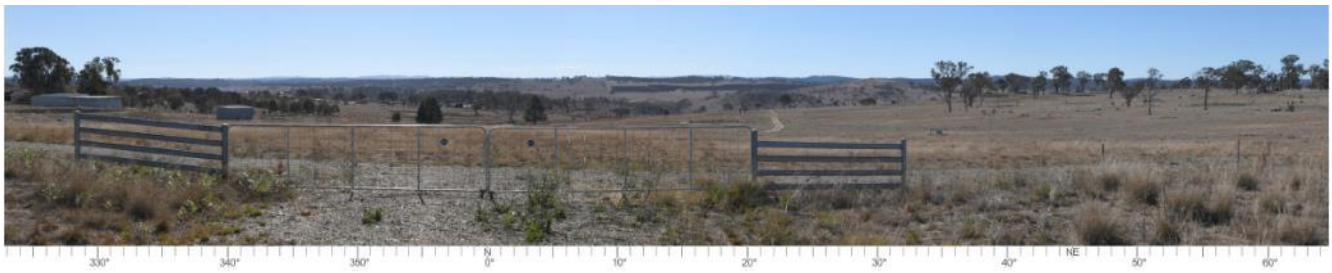


Figure 9-5 Photomontage

The project description in Section 3.0 of this report described the proposed infrastructure and the elevation change across the area of the proposed solar development. The Zones of Visual Influence (ZVI) discussed the likely visibility of the combined change in level and panel visibility as being potentially noticeable but would not be a dominant element in views. These observations are confirmed by the photomontage where the proposed panels are noticeable however their overall contribution to these views over ordinary day to day effects would be barely discernible.

For these reasons, the visual impact from this location, is negligible, even though there are clear and open views to the project.

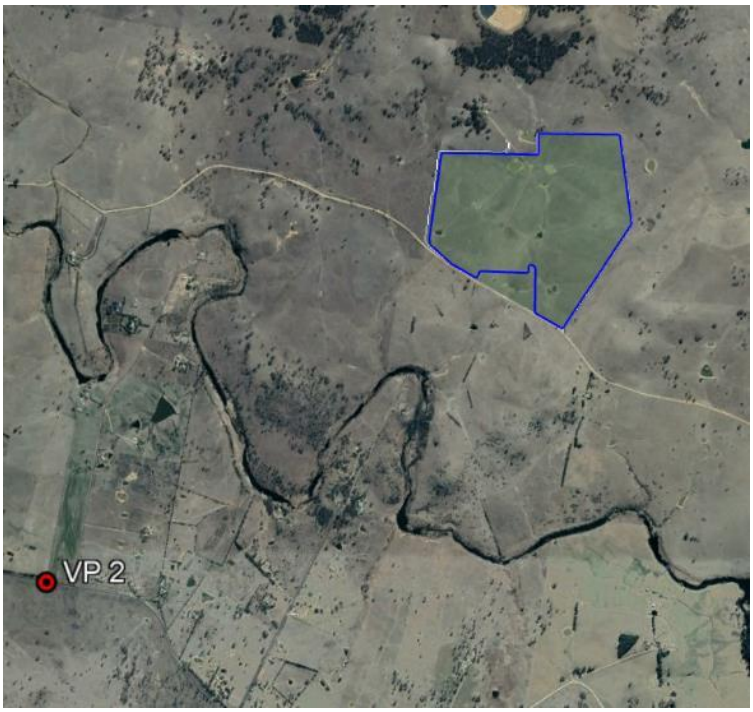
9.1.2 Viewpoint 2 – Castledoyle Road #2

This viewpoint is located along Castledoyle Road just west of its intersection with Andersons Road.

The nearest Project boundary and proposed solar panels are approximately 2.8 km to the north east.

This location was selected as there is a break in roadside vegetation that permits views through to the site.

Figure 9-6 shows the view looking north toward the project site.



Viewpoint coordinates: 56J 380774.18 m E, 6615570.68 m S (Placeholder)

Figure 9-6 Castledoyle Road looking northeast

From this location there are clear open views to the north and the Project area over cleared farmland and the valley of Commissioners Waters.

Figure 9-7 shows an enlargement of the view focusing on the location of the Project.

Figure 9-7 Enlargement

The proposed solar panels would be visible in the cleared area above the vegetation seen in the foreground of the view and below the vegetation on the elevated range. The distance to the nearest panel would be approximately 2.8 km to the northeast. The photomontage seen in Figure 9-5 in the proceeding viewpoint shows the likely visibility of the combined change in level and panel visibility as being potentially noticeable but would not be a dominant element in views.

The view angle from this location is at a lower elevation to the view seen in Viewpoint 1 and with more vegetation in the foreground of the view. For these reasons, the visual impact from this location, is negligible.

9.1.3 Viewpoint 3 – Andersons Road

Andersons road is a local road providing access to several rural residential properties within the RU4 Zone.

Andersons Road is truncated approximately 150 m to the north of this location.

The nearest Project boundary and proposed solar panel is approximately 1.5 km to the north east**.**

The viewpoint is taken from the eastern edge of the road reserve.

Figure 9-9 shows the view looking north east toward the project site.

Viewpoint coordinates: 56J 381410.25 m E, 6617161.05 m S

Figure 9-8 Viewpoint 3 - Andersons Road looking north east

From this location, the Project would be visible over the existing horse paddocks and between existing vegetation around the dwelling to the north west of Milne Road seen in the right of the image.

The proposed solar panels would be visible from Andersons Road. Views to the panels would be filtered through existing vegetation or screened by vegetation and topography.

Where visible, the proposed panels would be noticeable, however not a dominant feature in views. The visual impact would be low.

9.1.4 Viewpoint 4 – Milne Road

Milne Road is a local access road truncated at its northern end.

Milne Road has few potential viewer numbers, limited generally to residents. This viewing location is approximately 2.4 km south west of the nearest site boundary and proposed solar panel.

This location was selected as there are slightly elevated views to the site over existing vegetation within road reserves, nearby paddocks and surrounding residential dwellings.

Figure 9-9 shows the view looking north east toward the project site.

Viewpoint coordinates: 56J 382011.00 m E, 6615160.00 m S

Figure 9-9 Milne Road, looking north east

Trig Hill, which is a local landmark can be seen in the right of view over existing buildings and sheds.

Within this viewpoint, views are afforded to road users travelling north east along Milne Road. The subject site is visible on the horizon of the view somewhat directly in line with the road.

Figure 9-10 shows a photomontage of the same view with the proposed solar panels and other project infrastructure superimposed into the view.

Figure 9-10 Photomontage

The proposed solar panels would sit low in the landscape below the retained canopy vegetation situated on the elevated hills to the north of the site.

This location has been chosen as representative of greatest potential for views along Milne Road. Beyond this viewpoint, Milne Road descends in elevation, where intervening topography and vegetation seen in the background of this view screens or filters views to the Project.

The existing vegetation assists to demonstrate the effectiveness and ability for landscape screening to screen the proposed panels from nearby residential dwellings.

It must be recognised that the Project is located within an area zoned RU1 which is set aside for the purposes of farming and agriculture. This landscape is not rare, nor is it one that is protected against visual change.

The visual impact of the project would be low when compared to ordinary day to day effects.

9.1.5 Viewpoint 5 – Blue Hole Road

Blue Hole Road is the primary vehicular access road to Oxley Wild River National Park from Armidale and areas to the west.

Views from Blue Hole Creek Road across the landscape are dynamic due to the winding nature of the road that navigates the undulating topography, rocky outcrops and boulders and canopy vegetation in the surrounding landscape.

The nearest site boundary and proposed solar panel is 1.9km to the north of this location.

This location was selected as it is at the intersection of Blue Hole and Castledoyle Road and near to a large rocky outcrop that is of visual interest. There is also sufficient room along the road verges where visitors to the area may stop to either take in views or to confirm directions.

The SAA mapping indicated the proposed solar panels to be visible.

Figure 9-11 shows the view looking north toward the project.

Viewpoint coordinates: 56J 383747.00 m E, 6615023.00 m S

Figure 9-11 Viewpoint 9 - Gara Falls Reserve Entrance, looking north

From this location, there are sweeping views generally to the west and north towards to the Project. Trig Hill, which is a local landmark can be seen roughly central to the view and in the direction of the Project.

Figure 9-12 shows an enlargement of the view focusing on the site.

Figure 9-12 Enlargement

Although this viewing location is in an area of theoretical Project visibility, the actual views would be largely screened by Trig Hill limiting potential panel visibility to the northernmost area of the subject site and solar array.

Where visible, the project would be at such a distance that the proposed panels would appear as dark objects in the landscape which would be similar in color and contrast to the existing canopy vegetation seen along the elevated ridge to the north of the site and the planted bands of vegetation along property boundaries and fence lines.

This visual impact from this location would be a Negligible change in ordinary day-to-day views.

Gara Road is a local gravel road that runs between Grafton Road, approximately 4.7 km to the west and Silverton Road approximately 3.3 km to the east. Gara Road shares the sites southern boundary and is the location of the proposed point of access. The following selection of viewpoints describes the range and nature of views from several locations along the road where visibility of the Project was predicted in the SAA.

9.1.6 Viewpoint 6 – Gara Road #1

This viewpoint is located on Gara Road approximately 1.7 km east of the site boundary and proposed solar panels.

This location is on the eastern side of a local rise with clear views towards the project. This location is also one where the project was identified as being potentially visible in the SAA.

Views towards the site are over cleared agricultural land that is within the RU1 farming zone.

This landscape nor views are not afforded any protections or recognition within the local LEP.

Figure 9-13 shows the view looking north east toward the project site.

Viewpoint coordinates: 56J 381113.00 m E, 6617661.00 m S

Figure 9-13 Viewpoint 5 - Gara Road

The proposed solar panels would be visible in the low saddle formed by Trig Hill to the south of the site and the elevated ridge to the north.

Figure 9-14 shows an enlargement of the view and the site.

Figure 9-14 Enlargement

From this location, the majority of the Project will be situated behind the vegetated rise seen in the middle ground of this view.

The visual impact from this location would be Negligible due in part to the distance to the Project, limited visibility and low viewer numbers.

9.1.7 Viewpoint 7 - Gara Road #2

This viewpoint is located on Gara Road, at the southern site boundary and proposed access point.

There are no roadside stops or location of interest along the frontage of the site. This is also a local access road with limited traffic.

The Project will be clearly visible from this location due to the lack of roadside vegetation and close proximity to the project.

Figure 9-15 shows the view looking north west toward the project site.

Viewpoint coordinates: 56J 383161.00 m E, 6617269.00 m S

Figure 9-15 Viewpoint 3 - Gara Road Existing Property Entrance, looking north west

Figure 9-16 shows the view looking north east toward the project site.

Figure 9-16 Viewpoint 3 - Gara Road Existing Property Entrance, looking north east

This view shows the existing property access gate for the subject site. The site slopes up gently to the north and towards the vegetated ridgeline along the site's northern boundary. From this location the southernmost solar panels would be highly visible and would dominate views to the north. Views would be afforded along the rows of panels which would be oriented in a generally north – south alignment.

Although the panels would be highly visible and potentially dominant elements in this view, these views would be short in duration, seen by few people and over a landscape that is not one that is considered to be sensitive to visual change. For these reasons, the visual impact is assessed as low.

The community perception studies described in section 6.0 of this report indicated that some viewers considered the presence of panels to have a positive visual outcome in some areas. This location may be one where a project information or interpretive panels could be displayed. For these viewers, the visual impact may be positive.

9.1.8 Viewpoint 8 – Gara Road #3

This viewpoint is located on Gara Road approximately 230 m to the east of Project.

This location is on the western side of Gara Road where it crests Trig Hill.

Views towards the site are over cleared agricultural land that is within the RU1 farming zone.

This landscape nor views are not afforded any protections or recognition with the local LEP.

Figure 9-17 shows the view looking north west toward the project site.

Viewpoint coordinates: 56J, 383827.00 m E, 6616811.00 m S

Figure 9-17 Viewpoint 4 - Gara Road

From this viewpoint, the solar array will be situated between the low rises either side of Gara Road. The solar farm will be set somewhat low in the view and below the vegetated ridge to the north of the site.

The visual impact from this location would be Negligible due in part to the distance to the Project, limited visibility and low viewer numbers.

9.1.9 Viewpoint 9 – Gara Road / Silverton Road intersection #4

This viewpoint is located at the intersection of Gara Road and Silverton Road.

The nearest Project elements will be solar panels, approximately 3100m to the north west of this viewpoint.

Figure 9-18 shows the view looking north west toward the project site.

Viewpoint coordinates: 56J 386937.00 m E, 6616411.00 m S

Figure 9-18 Viewpoint 6 - Gara Road / Silverton Road Intersection

From this viewpoint, the majority of project elements are situated behind topography and some existing vegetation east of the site. A section of the northern solar arrays may be visible from this location, framed between the intervening rise and the rise at the north of the subject site. These views will be at such a distance that the solar arrays will be an indiscernible element in the broader landscape.

9.2 Summary of publicly accessible viewpoints

The assessment of publicly accessible locations within the viewshed of the project has determined that views to the project are limited to sections of local roads generally to the south of the project.

Gara Road will have the greatest visibility of the project, being at the southern border of the project site. Although visible at from Gara road, viewpoints along this road have been determined to have a visual impact of negligible-low. This is largely due to topography screening views to the project from the majority of the road, the largely modified landscape and the low viewer numbers of the area. The assessment has determined the project will also be visible from local roads further south including Castledoyle Road, Milne Road and Blue Hole Road. While visible, the project will not result in visual impacts rated higher than negligible to low from within these areas.

10. Residential Viewpoints

This section will examine the potential visual impacts from residential properties in proximity to the project.

The assessment of visual impact from residential dwellings first considers the potential visibility of the project from the dwelling or an area of private open space adjoining the dwelling, and the ability for the mitigation to assist with impacts.

The assessment of visual impact from residential viewpoints differs from publicly accessible viewpoints. For residents, visual change that may be brought about as a result of the Project may be more than a glimpse while in transit, such as views assessed in the preceding section. Rather, elements of the project have the potential to result in a permanent change in views for residents from their living areas or outdoor entertainment areas of their dwellings. It is recognised that adjoining landowners may have greater visibility of the project as they may work on their property. This has been considered and addressed in many appellant decisions for renewable energy projects where more weight is placed on those views from areas in close proximity to dwellings than working areas of land zoned for primary production.

The analysis of visual impact from residential properties is based on the following assumptions:

- An occupant of a residential dwelling will have a high degree of sensitivity to the change in their immediate landscape.
- Visitor numbers are not applicable to residences.
- Farmers may be able to see the solar array as they move around their property. These areas may be used as much in daylight hours as the living areas of their residences.
- Landscape can be designed to mitigate visual impact when located near a fixed viewpoint, such as a residence, with far greater ease than can be achieved along a road network.

Stringy Bark Solar Farm invited residences within proximity of the project who came to the first consultation session or who contacted them directly the opportunity to be assessed for potential visual impacts. Five residential dwellings accepted the offer. The viewpoint number, GPS co-ordinates and approximate distance to the nearest boundary are listed below.

Viewpoint No.	GPS Coordinates (UTM)	Distance and direction to nearest Project boundary
RVP 1 – 22 Milne Road	56J 381999.00 m E, 6614996.00 m S	2.60km north east
RVP 2 – 128 Milne Road	56J 382530.00 m E, 6616014.00 m S	1.44km north east
RVP 3 – 52 Milne Road	56J 382108.00 m E, 6615239.00 m S	2.32km north east
RVP 4 – 1203 Castle Doyle Road	56J 382261.00 m E, 6614840.00 m S	2.60km north east
RVP 5 – 1153 Castle Doyle Road	56J 381788.00 m E, 6615025.00 m S	2.68km north east
RVP 6 – 132 Milne Road, Castle Doyle	56J 382797.00 m E, 6616535.00 m S	850 m north

The nearest non-host land owner dwelling to the project is at 686 Gara Road Argyle. This dwelling is approximately 370 m to the south east of the nearest site boundary. The seen area analysis shows that the dwelling located in a visual shadow created by Trig Hill and will not have any views towards the project. There are also several large trees immediately north of the dwelling and in views towards the project area.

As the residential viewpoints are generally centered around Milne Road, the photomontage described at Viewpoint 4 of the report has been reproduced in the image below as it provides a useful reference for the visual change that may occur in this area.

Figure 10-1 Photomontage - View form Milne Road Looking north

Principles for considering views and visual impacts from residential dwellings is established in *Tenacity Consulting v Warringah Council 2004*[2]*.* This case sets out four clear principles which have been applied to several projects across NSW. These are set out in full at paragraphs 25 - 29 in the decision. Paragraphs 26-29 are reproduced below for the benefit of readers of this assessment:

26 The first step is the assessment of views to be affected. Water views are valued more highly than land views. Iconic views (eg of the Opera House, the Harbour Bridge or North Head) are valued more highly than views without icons. Whole views are valued more highly than partial views, eg a water view in which the interface between land and water is visible is more valuable than one in which it is obscured.

27 The second step is to consider from what part of the property the views are obtained. For example the protection of views across side boundaries is more difficult than the protection of views from front and rear boundaries. In addition, whether the view is enjoyed from a standing or sitting position may also be relevant. Sitting views are more difficult to protect than standing views. The expectation to retain side views and sitting views is often unrealistic.

28 The third step is to assess the extent of the impact. This should be done for the whole of the property, not just for the view that is affected. The impact on views from living areas is more significant than from bedrooms or service areas (though views from kitchens are highly valued because people spend so much time in them). The impact may be assessed quantitatively, but in many cases this can be meaningless. For example, it is unhelpful to say that the view loss is 20% if it includes one of the sails of the Opera House. It is usually more useful to assess the view loss qualitatively as negligible, minor, moderate, severe or devastating.

29 The fourth step is to assess the reasonableness of the proposal that is causing the impact. A development that complies with all planning controls would be considered more reasonable than one that breaches them. Where an impact on views arises as a result of non-compliance with one or more planning controls, even a moderate impact may be considered unreasonable. With a complying proposal, the question should be asked whether a more skilful design could provide the applicant with the same development potential and amenity and reduce the impact on the views of neighbours. If the answer to that question is no, then the view impact of a complying development would probably be considered acceptable and the view sharing reasonable.

These principles set-out specific guidance for views and visual impact from residential properties and dwellings. The description at paragraph 28 refers to an assessment to be undertaken from the whole of the property. This refers generally to the area immediately surrounding the dwelling and areas of private open space and amenity. It is well established through many wind farm proposals in NSW that views from working areas of farms are less visually sensitive than from that the attached dwelling.

[2] https://www.caselaw.nsw.gov.au/decision/549f893b3004262463ad0cc6

10.1.1 RVP 1 – 22 Milne Road, Castle Doyle

RVP 1 is located at 22 Milne Road, Castle Doyle.

The dwelling is approximately 2.60km south west of the project.

Figure 10-2 shows the northern dwelling elevation oriented towards the Project

Figure 10-2 Northern Elevation

Figure 10-3 shows the view from the dwelling looking north east toward the project.

Figure 10-3 RVP 1 - View looking north east from the fence line

There are wide views to the north and towards the project from the frontage of this dwelling. Views in this direction include fencing, buildings and structures on adjoining properties and rows of planted vegetation along fence lines, roadsides and around nearby dwellings.

Views to the western (left) area of the project are filtered by existing vegetation and buildings on the adjoining properties to the north of the dwelling. Part of the eastern Project boundary will be screened by Trigg Hill seen in the right of this image.

Figure 10-4 shows an enlargement of this view focusing on the site.

Figure 10-4 Enlargement

These views will be similar in scale to the photomontage prepared at Castledoyle Road discussed at Viewpoint 1. From this location, the project would be visible on the cleared area in the background of the view to the right of the lighter colored dwelling roof. Existing vegetation at the northern end of this property would filter or screen views to part of the project.

The project will be visible in the background of this view. The project would not alter or remove the near term or middle ground views. At this distance, the project would be visually similar to the existing roofs seen in the adjoining structures to the north of this location.

For the reasons outlined above, the visual impact from this dwelling would be low.

10.1.2 RVP 2 – 128 Milne Road, Castle Doyle

RVP 2 is located at 128 Milne Road, Castle Doyle.

The dwelling is approximately 1.44 km south west of the project.

Figure 10-5 shows the view from the dwelling looking north to east.

Figure 10-5 RVP 2 - View looking north to east from the dwelling

From this location, views toward the project will be screened or filtered by existing vegetation on the property.

There will be no visual impact from the immediate area surrounding this dwelling.

10.1.3 RVP 3 – 52 Milne Road, Castle Doyle

RVP 3 is located at 52 Milne Road, Castle Doyle.

The dwelling is approximately 2.32km south west of the project.

Figure 10-6 shows the view from the dwelling looking north east toward the project.

Figure 10-6 RVP 3 - View looking north east from the dwelling

This view is taken from the fence line to the north of the dwelling.

There are generally wide views ranging from the north west through to the east. Longer views to the right of Trigg Hill are afforded along a local valley away from the site that leads down to Commissioners Waters in the middle ground of this view.

Views towards the Project include buildings and structures on adjoining properties to the north as rows and planted vegetation along fence lines, roadsides and around nearby dwellings.

Views to the western (left) area of the Project are filtered by existing vegetation and buildings on the adjoining properties to the north of the dwelling. Part of the eastern Project boundary will be screened by Trigg Hill seen in roughly central to this image.

Figure 10-7 shows an enlargement of this view focusing on the Project area.

Figure 10-7 RVP 3 - Enlargement

Although visible, the project will not form a dominant visual element in the landscape at this distance.

Views from this location will be similar in distance and viewing angle to the photomontage prepared at Castledoyle Road discussed at Viewpoint 1. Views of the Project from this location however, are partially screened or filtered by existing vegetation and the lower slopes of the western side of Trig Hill. Views from this location also include the roofs of several buildings and structures in the farming properties to the north of this dwelling.

The project will be visible in the background of this view, however it would sit low on the visible slopes and would be partially screened or filtered. The project would not alter or remove the near term or middle ground views nor will it detract from the longer views to the east (right) of Trigg Hill.

The visual impact from this dwelling from this dwelling would be low – negligible.

10.1.4 RVP 4 – 1203 Castle Doyle Road, Castle Doyle

RVP 4 is located at 1203 Castle Doyle Road, Castle Doyle.

The dwelling is approximately 2.6km south west of the project.

Figure 10-8 shows the view from the dwelling looking north east toward the project.

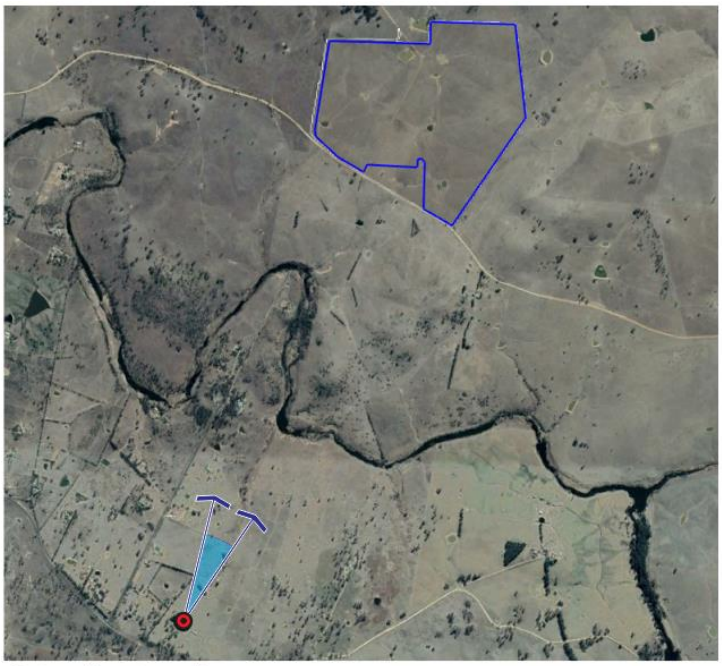


Figure 10-8 RVP 4 - View looking north east from the dwelling

Views to the north are from an elevated outdoor entertaining area which extend from the primary living zones from within the main dwelling. The view to the north and the Project area are framed by existing vegetation within the dwellings garden and the farmland to the north of the site.

Foreground views from this dwelling are over cleared gently undulating farmland that lead down to Commissioners Waters seen in the middle ground of Figure 10-8. Background elements include Trigg Hill, the site which is visible to the left of Trigg Hill and the vegetated range along the northern boundary of the subject site.

Figure 10-9 shows and enlargement of this view focusing on the site.

Figure 10-9 RVP 4 - Enlargement

The majority of the site and the solar array would be visible from this location. The view and view angle to the Project would be similar in scale to the photomontage prepared at Castledoyle Road discussed at Viewpoint 1 which is approximately 270 m to the south east of this dwelling.

From this location, the majority of the project would be visible on the cleared area in the background of the view. The project would not alter nor remove the near term or middle ground views over the areas of cleared farmland or the valley in which Commissioners Waters is located.

The visual impact from this dwelling from this dwelling would be low.

10.1.5 RVP 5 – 1153 Castle Doyle Road

RVP 5 is located at 1153 Castle Doyle Road, Castle Doyle.

The dwelling is approximately 2.66km south west of the project.

Figure 10-10 shows the view from the fire pit immediately north of the dwelling looking generally north east.

Figure 10-10 RVP 5 - View looking north east from outdoor firepit area

From this location, which is directly north of the dwelling, the majority of the Project would be screened or filtered by vegetation in the farming areas to the north of this property.

Figure 10-11 shows the view from the fence line looking north east toward the project. This location is to the north east of the dwelling and the location shown in the view above.

Figure 10-11 RVP 5 - View looking north east from the fence line

Figure 10-12 shows and enlargement of this view focusing on the site.

Figure 10-12 RVP5 Enlargement

Views to the project may be afforded and will be similar in scale to those shown in the photomontage from Milne Road.

The upper sections of the solar array would be visible in the background of the view to the left of the two large pine trees and the right of the dam seen in the foreground of this view.

The lower section of the Project would be screened by the existing vegetation seen in the middle ground of this view. The amended project layout which moved the northern extend of the solar array further down the hill will mean that there will be a clear and visible break between the upper (northern) edge of the solar array and the vegetation seen on the elevated range in the background of this view.

The project will be visible in the background of this view, and either partially or wholly screened or filtered by topography and vegetation.

Where the project is visible, it would be a small element in views. The visual impact from this dwelling would be low – negligible.

10.1.6 RVP 6 – 132 Milne Road, Castle Doyle

RVP 6 is a residential dwelling located in the farming area to the south of the site.

The dwelling is approximately 850 m to the south of the nearest site boundary.

Access to the property was not available for the purposes of undertaking an assessment of the views and visual impact of the project. This assessment is therefore based on an appropriation of views from the area surround the dwelling and the project.

Figure 10-8 shows the view from the dwelling looking north east toward the project.

Figure 10-13 Northern facade - 132 Gara Road, Metz

This view is taken using a 300 m zoom from Gara road outside the existing site entrance. The dwelling is set low in the landscape and has a verandah on the northern side of the dwelling oriented towards the site.

Being set low in the landscape, views from the dwelling towards the site will be up along a gradual and consistent slope that runs through the site.

Figure 10-14 shows the view angle looking north from the same location as the viewing location seen in Figure 10-13.

Figure 10-14 View angle looking north from Gara Road

Views from the dwelling are likely to see the first few rows of panels due to the gradual incline from the dwelling through to the northern extent of the proposed panels.

At this distance, the 4.0m high panels may be noticeable but they will not be visual dominant features. Further, because of this low and consistent view angle, landscape screening along Gara Road will be effective at screening views of the Project.

For these reasons, the visual impact from this dwelling is expected to be low.

11. Landscape Mitigation

Landscape mitigation can be effective at managing visual and glare impacts of solar farm projects. The photomontages shown in the preceding sections demonstrate that landscape mitigation will be an effective measure in managing potential visual impacts that might be brought about by the Project from sensitive viewing locations.

The Project has committed to establishing landscaping at strategic locations to minimise the visual impact to the neighbouring properties. They have also committed to early establishment of landscape plantings.

The proposed landscaping would seek to establish new plantings along the areas indicated in green in the Site Plan in Figure 11-1.

The location for landscape mitigation described in the assessment of Residential viewpoints was determined through the visual assessment, photomontages and consultation with the local community. This collaboration will continue throughout the planning application process.

Figure 11-1 shows the proposed landscape screening locations, width of the planting area and number of rows of plantings at each location.

Figure 11-1 Proposed Screening location

Vegetation selection will be fundamental to the successful outcomes of the proposed landscape plantings.

Suggested species include:

- *Eucalyptus leucoxylon rosea*
- *Eucalyptus blakelyi*
- *Eucalyptus boliviana*
- *Eucalyptus stricta*
- *Banksia integrifolia*

These species are indigenous to the area and will provide for a range of vegetation heights, varying growth rates and canopy density.

11.1 Characteristics of Landscape Screening

Figure 11-2 below shows a recent example of landscape screening has been established with rows of layered planting in proximity to the project. The composition of the vegetation is structurally and visually similar to the proposed species which are found within the region of the project.

Figure 11-2: Existing vegetation – Gara Road

The fourth row of planting is approximately 5.0 m in height and taller than the proposed panels. Even at this close range, there are no discernible breaks in vegetation that would permit views through to the proposed solar farm.

These proposed plantings would not be dissimilar to existing landscape and wind break plantings found in many areas in proximity to the site and the immediate project boundary.

12. Glare Assessment

Glare effect can be described as the presence of light within the field of human vision that will cause discomfort or visual impairment. This may be experienced when viewing the reflected sunlight off surfaces such as metal, water or glass. Factors that contribute to glare hazard for a solar farm include:

- Reflectivity of surfaces;
- Angle of incidence;
- Strength of the light source;
- Location of receptors; and
- Distance

The assessment of the effect of glare varies depending on the intensity of incoming light, relativity to the field of human vision, duration of exposure, size of the glare and distance of the receiver from the glare source.

Glare is defined as either discomfort or disability glare. Discomfort glare will cause difficulty in viewing the object(s) being focused upon. Disability glare occurs when vision is impaired for a short or sustained period. This may include the presence of an 'after-image' in the sight of the viewer once they turn from the source of glare. Disability glare is a primary and common cause of concern in relation to road safety.

A glare analysis determines the potential for glare and the potential hazard level of the glare. Figure 12-1 shows the ocular impacts across glare hazard ranges.

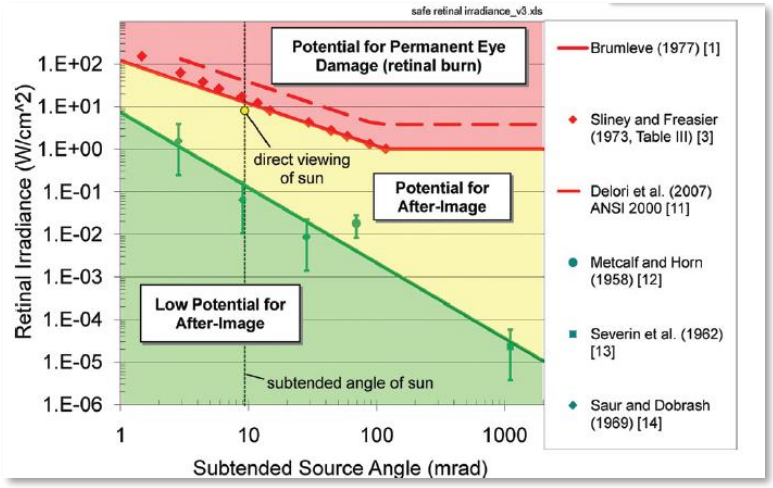


Figure 12-1 Ocular impacts and Hazard Ranges

Glint and glare effects are not uncommon from existing structures in the surrounding landscape such as sheds and farm buildings, the reflection from dams and water bodies such as the open water areas of Commissioners Waters. These are usually unmitigated and are an accepted part of any location.

12.1 Glare Analysis

The Glare Assessment reviewed the potential for glare impacts at 32 sensitive locations including nearby residential properties and 'route receptors' along Gara and Castledoyle Road.

This assessment was undertaken using the Forge Solar SGHAT tool which is proprietary software developed specifically for this analysis of glare impacts. Table 2 below sets out the input criteria upon which this assessment has been based.

Table 2 Glare Analysis Parameters

Parameter	Input
Fixed/Tracking	Single-axis tracking
Tracking axis orientation	0.0 deg (Southern Hemisphere N-S)
Tracking axis tilt	5.0 deg
Tracking axis panel offset	0.0 deg
Maximum tracking angle	60.00 deg
Resting angle	60.00 deg
Rated power	N/A
Panel Material	Smooth glass with AR coating
Slope Error	8.43 mrad
Panel Height above ground (centre)	2.0m

Based on the above input criteria, there were no glare impacts predicted for each of the 32 receptor locations. The results for each location can be found in the appendices of this report.

Should this change, there are two key ways in which glare impacts can be mitigated at sensitive locations. Recognising that the Stringybark solar array proposes to utilise a single axis tracking solar panel system, the panels can be manually controlled to obviate any predicted or actual glare impacts that might be brought about by the solar array. This is achieved by 'stalling' the panels at particular times of the day and year while the sun tracks through the sun angle that contributes to glare.

Secondly, glare and glint impacts are primarily attributed to visibility of the proposed solar panels. The preceding section and photomontages demonstrate that landscape mitigation can also be effective at ameliorating any views and visual impact of the proposed solar panels. This will also avoid the potential for solar glare from sensitive receptors.

This glare assessment should be reconfirmed once the project and proposed panel layout is approved and prior to construction. The areas of landscape screening may also be adjusted if required.

13. Conclusion

Stringybark Solar Farm Pty Limited (the Proponent) is seeking development approval to construct the proposed 29.9 MW Stringybark Solar Farm in an agricultural area approximately 12.0 km south east of Armidale NSW.

The site and the majority of the surrounding area is within the Rural Use 1 Zone – Primary Production (RU1) Rural Use Zone 4 – Primary Production Small Lots (RU4). This includes the areas around Anderson and Milne Road which include several residential properties. These agricultural zones are not sensitive. These zones also recognise that uses within these areas may have the potential for offsite amenity impacts such as odor, noise, dust or visual such as those areas set aside for farming practices.

The site is not visible from sensitive locations such as Oxley Wild Rivers National Park to the south east or Imbota Nature Reserve to the west.

The Project has been designed to reduce the visual impact of the proposed solar array by placing the project low on the site, placing non-critical project infrastructure out of key views, undergrounding grid connecting power lines and avoiding the need to remove vegetation where practicable.

The locations with the greatest potential for visual impact based on distance are those areas within 500 m of the project. Beyond this distance the project will be a noticeable element in views but it will not be a dominant visual feature.

13.1 Views from the road network

Views from the surrounding road network are limited to short section of Gara Road, which is a local gravel road with few road users.

Any views from Castledoyle and Blue Hole Road are limited to locations where a break in topography, vegetation and buildings permits views across the landscape to the north and the site. The photomontage shown at Viewpoint 1 shows that even where there are clear open views to the project, the proposed solar array would not be a dominant feature.

These roads carry relatively low traffic numbers and therefore limit the potential number of people who may view the project. The visual impact from the local road network will be negligible.

13.2 Views from the residential dwellings

The Project will be visible from residential dwellings in the farming areas to the south of site. These dwellings are within an area that is zoned RU4 – Primary Production Small Lots, a zone which contemplates some amenity impacts from nearby farming areas.

The visual impact from residential dwellings has been assessed as negligible to low. This assessment is due in part to the views from the majority of the residential dwellings being partially screened or filtered by either topography, vegetation or both, and where the Project is visible, dwellings are at a such a distance that the project would not be a dominant feature in views.

Overtime, the proposed landscape mitigation would further assist to reduce visibility of the solar array, further reducing the visual impact of the Project.

13.3 Glare Results

The glare assessment did not predict any areas where glare would be recorded at any sensitive receptor locations.

If required, glare impacts can be mitigated by manually controlling the panels to obviate any glare impacts at sensitive locations or through landscape mitigation which can also be effective at ameliorating views and therefore potential for solar glare from sensitive receptors.

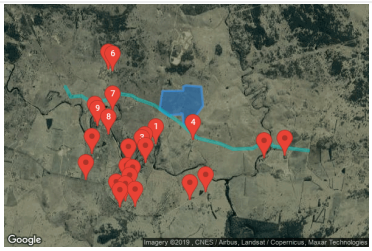
A.1 Preliminary Glare Analysis

ForgeSolar
PV planning & glare analysis

GlareGauge Glare Analysis Results

Site Configuration: Stringy Bark Solar Farm

Project site configuration details and results.



Created **July 8, 2019 2:29 a.m.**
Updated **Aug. 6, 2019 7:46 p.m.**
DNI **varies** and peaks at **1,000.0 W/m^2**
Analyze every **1** minute(s)
0.5 ocular transmission coefficient
0.002 m pupil diameter
0.017 m eye focal length
9.3 mrad sun subtended angle
Timezone **UTC10**
Site Configuration ID: 29334.5260

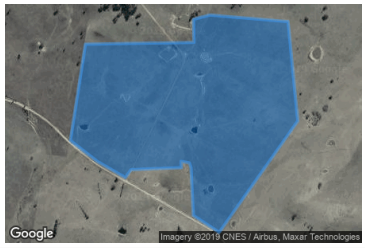
Summary of Results No glare predicted!

PV name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
Stringy Bark Solar Farm	SA tracking	SA tracking	0	0	-

Component Data

PV Array(s)

Name: Stringy Bark Solar Farm
Description: Correct 2m centroid panel height height single axis tracking panels with ARC 0 degree orientation
Axis tracking: Single-axis rotation
Tracking axis orientation: 0.0 deg
Tracking axis tilt: 5.0 deg
Tracking axis panel offset: 0.0 deg
Maximum tracking angle: 60.0 deg
Resting angle: 60.0 deg
Rated power: -
Panel material: Smooth glass with AR coating
Vary reflectivity with sun position? Yes
Correlate slope error with surface type? Yes
Slope error: 8.43 mrad



Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.573610	151.786789	955.25	2.00	957.25
2	-30.568446	151.791037	960.36	2.00	962.36
3	-30.563836	151.790512	973.32	2.00	975.32
4	-30.563531	151.786285	979.48	2.00	981.48
5	-30.563730	151.785399	975.39	2.00	977.39
6	-30.564802	151.785421	970.53	2.00	972.53
7	-30.564885	151.779552	970.31	2.00	972.31
8	-30.569353	151.778737	949.81	2.00	951.81
9	-30.570314	151.780186	950.16	2.00	952.16
10	-30.571071	151.781709	951.35	2.00	953.35
11	-30.570702	151.782020	952.70	2.00	954.70
12	-30.570609	151.784745	950.74	2.00	952.74
13	-30.570314	151.784724	951.90	2.00	953.90
14	-30.570388	151.785175	952.16	2.00	954.16
15	-30.570609	151.785260	951.42	2.00	953.42
16	-30.572826	151.785389	950.68	2.00	952.68

Route Receptor(s)

Name: Gara Road
Route type Two-way
View angle: 50.0 deg

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	m	m	m
1	-30.563858	151.752154	951.04	2.00	953.04
2	-30.566297	151.753699	946.75	2.00	948.75
3	-30.566075	151.756703	940.66	2.00	942.66
4	-30.567627	151.759450	956.01	2.00	958.01
5	-30.567110	151.763570	944.11	2.00	946.11
6	-30.565336	151.765801	941.10	2.00	943.10
7	-30.566001	151.770951	955.40	2.00	957.40
8	-30.566888	151.772582	961.32	2.00	963.32
9	-30.568292	151.777217	949.24	2.00	951.24
10	-30.572431	151.784255	946.71	2.00	948.71
11	-30.576126	151.789061	965.19	2.00	967.19
12	-30.576495	151.790091	962.04	2.00	964.04
13	-30.577677	151.795842	944.81	2.00	946.81
14	-30.579007	151.799447	953.03	2.00	955.03
15	-30.578860	151.805026	950.86	2.00	952.86
16	-30.576938	151.808545	929.24	2.00	931.24
17	-30.577456	151.809918	919.35	2.00	921.35
18	-30.578342	151.810948	920.64	2.00	922.64
19	-30.579377	151.820705	968.60	2.00	970.60

Discrete Observation Receptors

Number	Latitude	Longitude	Ground elevation	Height above ground	Total Elevation
	deg	deg	m	m	m
OP 1	-30.577888	151.777683	926.45	2.00	928.45
OP 2	-30.579906	151.774619	932.48	2.00	934.48
OP 3	-30.580544	151.773793	933.64	2.00	935.64
OP 4	-30.576830	151.788250	968.93	2.00	970.93
OP 5	-30.559682	151.764323	972.23	2.00	974.23
OP 6	-30.560255	151.765497	968.48	2.00	970.48
OP 7	-30.569875	151.765529	941.25	2.00	943.25
OP 8	-30.575491	151.764318	942.58	2.00	944.58
OP 9	-30.573422	151.761314	950.33	2.00	952.33
OP 10	-30.572442	151.760584	947.85	2.00	949.85
OP 11	-30.580325	151.759750	948.94	2.00	950.94
OP 12	-30.582499	151.774861	942.21	2.00	944.21
OP 13	-30.582785	151.770065	932.12	2.00	934.12
OP 14	-30.581301	151.808276	925.69	2.00	927.69
OP 15	-30.591346	151.766562	979.28	2.00	981.28
OP 16	-30.593175	151.771948	974.04	2.00	976.04
OP 17	-30.589702	151.770338	970.75	2.00	972.75
OP 18	-30.587873	151.771175	964.00	2.00	966.00
OP 19	-30.587448	151.769501	963.61	2.00	965.61
OP 20	-30.591882	151.769094	977.95	2.00	979.95
OP 21	-30.580742	151.814145	942.53	2.00	944.53
OP 22	-30.589613	151.791868	950.83	2.00	952.83
OP 23	-30.586644	151.758005	968.84	0.00	968.84
OP 24	-30.593285	151.767562	990.44	0.00	990.44
OP 25	-30.591512	151.787356	963.83	0.00	963.83

PV Array Results

Stringy Bark Solar Farm

Component	Green glare (min)	Yellow glare (min)
OP: OP 1	0	0
OP: OP 2	0	0
OP: OP 3	0	0
OP: OP 4	0	0
OP: OP 5	0	0
OP: OP 6	0	0
OP: OP 7	0	0
OP: OP 8	0	0
OP: OP 9	0	0
OP: OP 10	0	0
OP: OP 11	0	0
OP: OP 12	0	0
OP: OP 13	0	0
OP: OP 14	0	0
OP: OP 15	0	0
OP: OP 16	0	0
OP: OP 17	0	0
OP: OP 18	0	0
OP: OP 19	0	0
OP: OP 20	0	0
OP: OP 21	0	0
OP: OP 22	0	0
OP: OP 23	0	0
OP: OP 24	0	0
OP: OP 25	0	0
Route: Gara Road	0	0

Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Refer to the **Help page** for assumptions and limitations not listed here.

A.2 Photomontages

Milne Road

View looking north east to east

(GPS 56 J, 382011 m E, 6615160 m S)

Existing view

Photomontage

See Sheet 2

Viewpoint Map

Viewpoint location and orientation

JACOBS

Stringy Bark Solar Farm: Milne Road
COORDINATES: GPS 56J 382011 m E, 6615160 m S
PREPARED BY: HB
SHEET: 1/4 DATE: 27/06/2019

Milne Road

60 Degree view looking north to north east

(GPS 56 J, 382011 m E, 6615160 m S)

Existing view

Photomontage

JACOBS

Stringy Bark Solar Farm: Milne Road
COORDINATES: GPS 56J 382011 m E, 6615160 m S
PREPARED BY: HB
SHEET: 2/4 DATE: 27/06/2019

Milne Road

View looking north east to east

(GPS 56 J, 382011 m E, 6615160 m S)

Photomontage

Photomontage with vegetation screening

Viewpoint Map

Distance to Project: Approximately 2.4km North East

Viewpoint location and orientation

JACOBS

Stringy Bark Solar Farm: Milne Road
COORDINATES: GPS 56J 382011 m E, 6615160 m S
PREPARED BY: HB
SHEET: 3/4 DATE: 27/06/2019

Milne Road

Wireframe view looking north east to east

(GPS 56 J, 382011 m E, 6615160 m S)

Existing view

Wireframe

Viewpoint Map

Viewpoint location and orientation

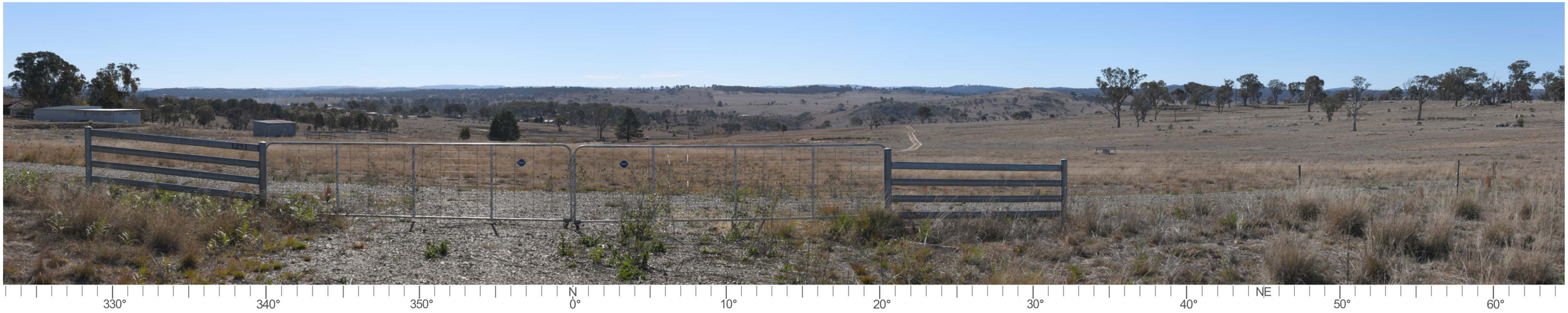
JACOBS

Stringy Bark Solar Farm: Milne Road
COORDINATES: GPS 56J 382011 m E, 6615160 m S
PREPARED BY: HB
SHEET: 4/4 DATE: 27/06/2019

Castledoyle Road

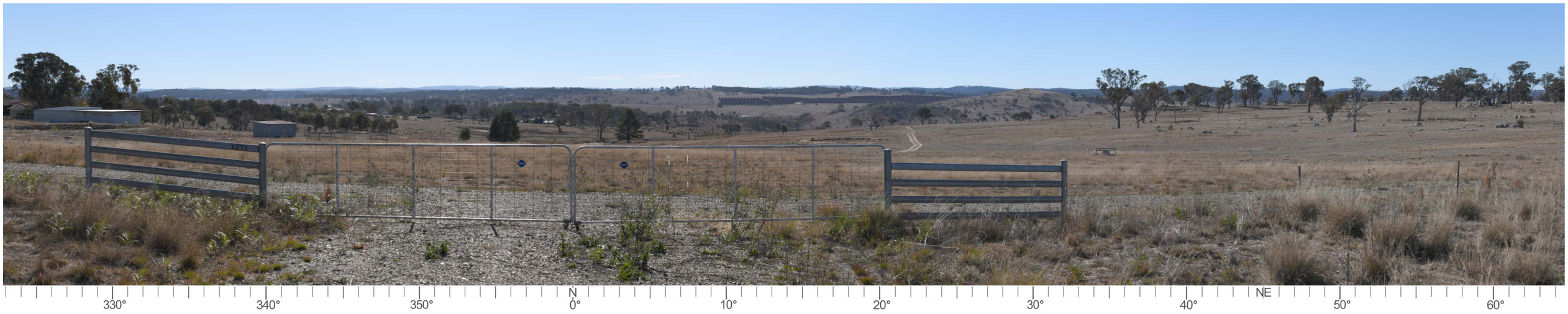
View looking north west to north east

(GPS 56 J, 382408 m E, 6614605 m S)



Existing view

See Sheet 2



Photomontage

Viewpoint Map

Viewpoint location and orientation

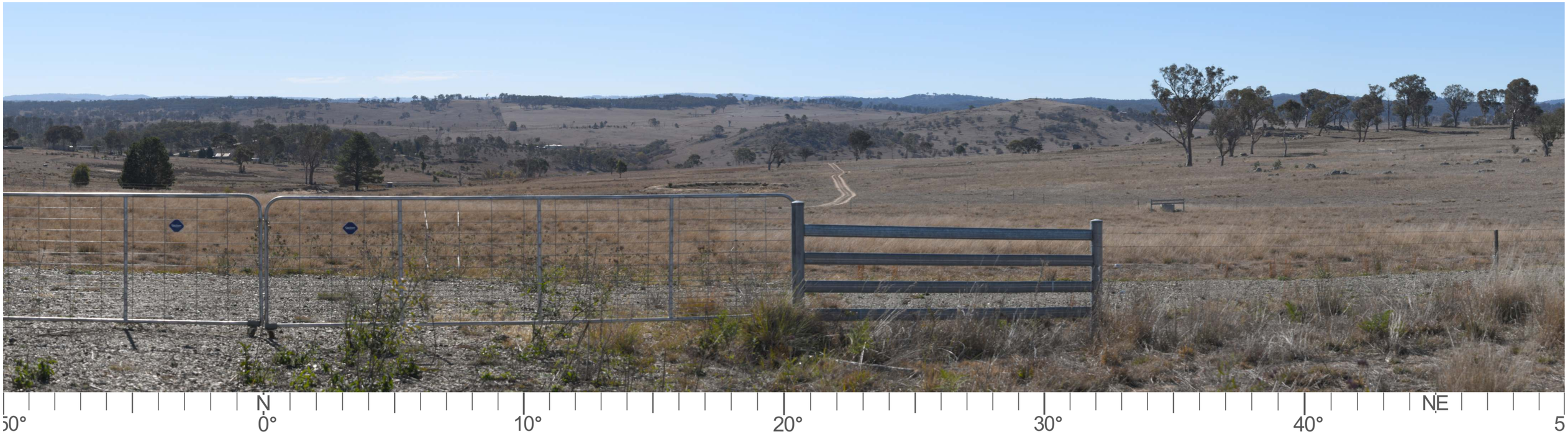
JACOBS

Stringy Bark Solar Farm: Castledoyle Road
COORDINATES: GPS 56J 382408 m E, 6614605 m S
PREPARED BY: HB
SHEET: 1/4 DATE: 22/07/2019

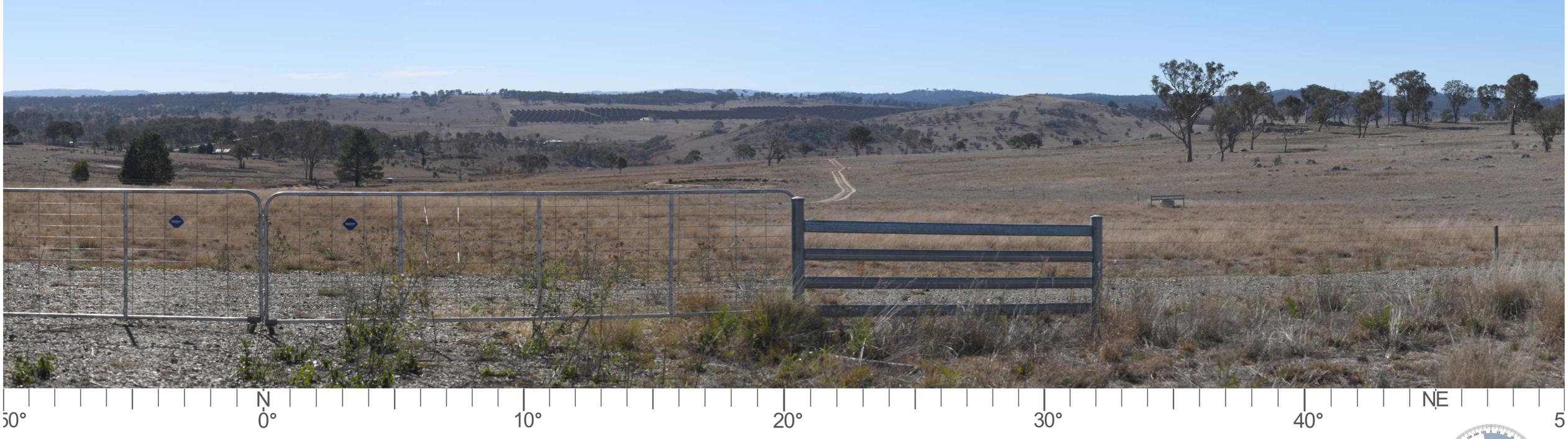
Castledoyle Road

60 Degree view looking north to north east

(GPS 56 J, 382408 m E, 6614605 m S)



Existing view



Photomontage

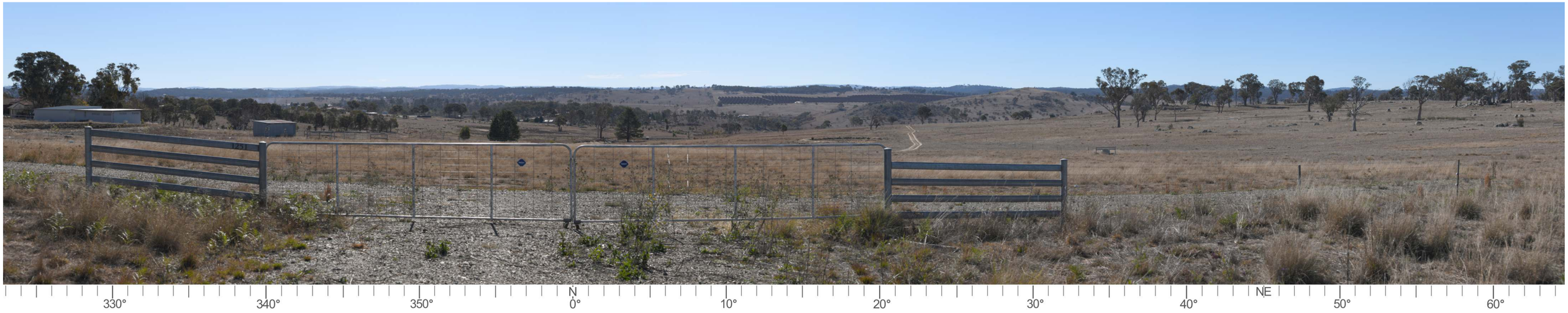
JACOBS

Stringy Bark Solar Farm: Castledoyle Road
COORDINATES: GPS 56J 382408 m E, 6614605 m S
PREPARED BY: HB
SHEET: 2/4 DATE: 22/07/2019

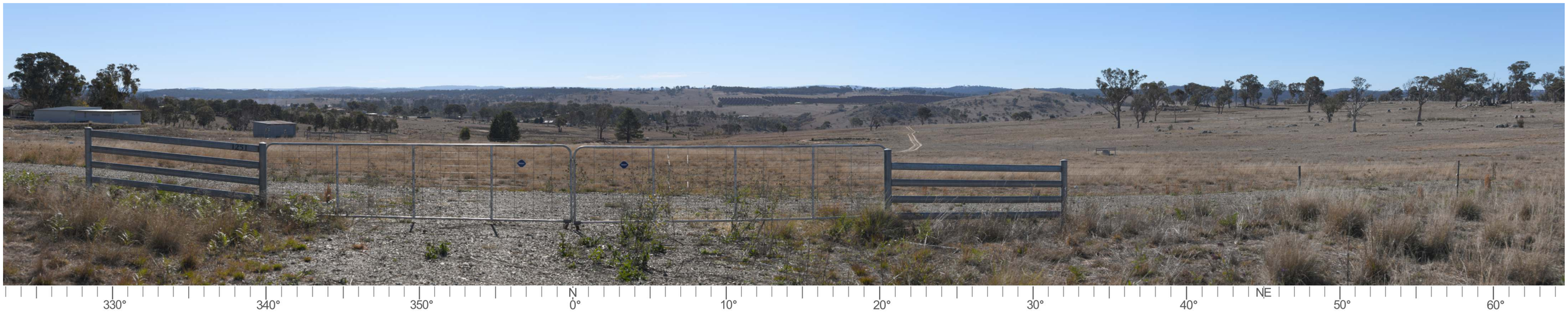
Castledoyle Road

View looking north west to north east

(GPS 56 J, 382408 m E, 6614605 m S)



Photomontage



Photomontage with Vegetation Screening

Viewpoint Map

Distance to Project: Approximately 2.7km North East

Viewpoint location and orientation

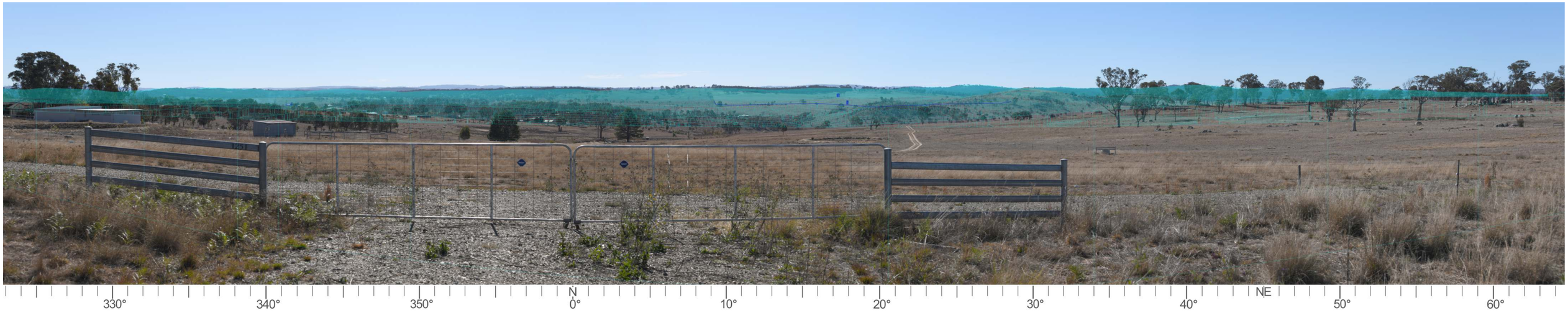
JACOBS

Stringy Bark Solar Farm: Castledoyle Road
COORDINATES: GPS 56J 382408 m E, 6614605 m S
PREPARED BY: HB
SHEET: 3/4 DATE: 22/07/2019

Castledoyle Road

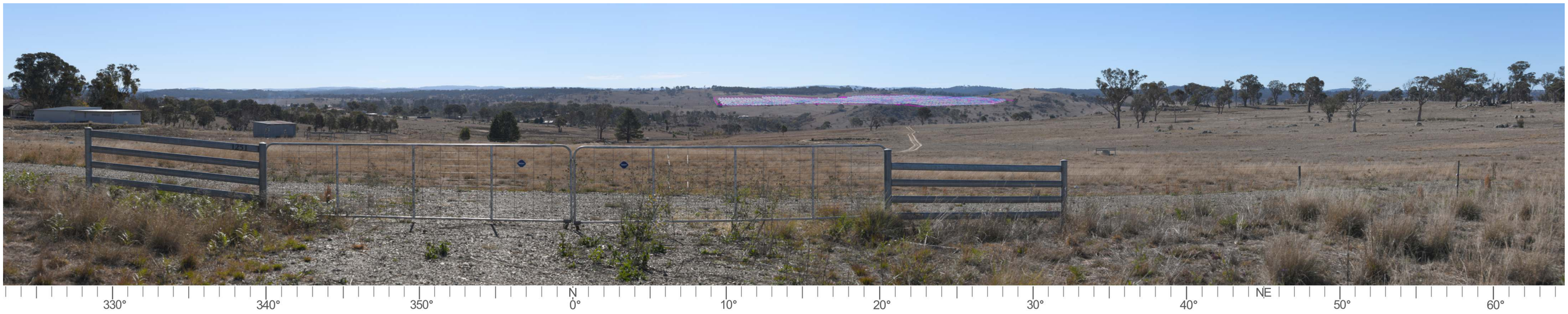
Wireframe view looking north west to north east

(GPS 56 J, 382408 m E, 6614605 m S)



Existing view

See Sheet 2



Wireframe

Viewpoint Map

Distance to Project: Approximately 2.7km North East

Viewpoint location and orientation

JACOBS

Stringy Bark Solar Farm: Castledoyle Road
COORDINATES: GPS 56J 382408 m E, 6614605 m S
PREPARED BY: HB
SHEET: 4/4 DATE: 22/07/2019