

Appendix H: Visual impact assessment





Sandigo Solar Farm: Visual Impact Assessment

February 2018

Sandigo Solar Farm

Visual Impact Assessment

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Contents

Abbreviations	iv
1 Introduction.....	1
1.1 Context.....	1
1.2 Study area	1
1.3 Proposed development.....	3
1.3.1 Overview	3
1.3.2 Solar panels	6
1.3.3 Power Conversion Units	6
1.3.4 Step-up Transformer and substation	7
1.3.5 Internal roads	7
1.3.6 Site office.....	7
1.3.7 Maintenance building	7
1.3.8 Site access and parking	7
1.3.9 Site fencing.....	8
1.3.10 External lighting	8
1.3.11 Operation	8
1.3.12 Planning context.....	8
1.3.13 Activities that may have a visual impact at the site	9
1.4 Methodology.....	9
2 Existing landscape character	11
2.1 Purpose	11
2.2 Landscape description	11
2.2.1 Dominant character	11
2.2.2 Topography	12
2.2.3 Adjacent roads	13
2.2.4 Surrounding dwellings.....	13
2.2.5 Recreational features	13
2.2.6 Existing vegetation	15
3 Visual impact assessment	16
3.1 Grading matrix	16
3.1.1 Receivers	17
3.1.2 Sensitivity	18
3.1.3 Magnitude	18
3.2 Selected receivers and viewpoints.....	19

3.2.1	Receivers	19
3.2.2	Viewpoints.....	20
3.3	View point impact assessment	21
3.3.1	Viewpoint 1	21
3.3.2	Viewpoint 2	22
3.3.3	Viewpoint 3	23
3.3.4	Viewpoint 4	24
3.3.5	Viewpoint 5	25
3.3.6	Viewpoint 6	26
3.3.7	Viewpoint 7	27
3.3.8	Viewpoint 8	28
3.4	Visual impact assessment summary	29
3.4.1	Receiver with the highest visual impact rating	31
3.4.2	Other receivers with visual impact ratings of greater than negligible.....	31
3.4.3	Receivers with a visual impact rating of negligible	31
3.4.4	Reducing the visual impact	31
3.4.5	Community and stakeholder consultation.....	31
3.5	Night lighting.....	31
3.5.1	Residences.....	32
3.5.2	Scenic/significant vistas	32
3.5.3	Air traffic.....	32
3.5.4	Road corridors	32
3.6	Glare and reflectivity.....	33
3.6.1	Solar panel design	33
3.6.2	Impact on visual receivers.....	34
4	Visual impact assessment management and mitigation measures	35
4.1	Objectives and principles	35
4.2	Design phase measures.....	35
4.3	Construction phase measures.....	36
4.4	Operation phase measures	36
4.5	Decommissioning phase measures	36
5	Conclusion	37
6	References.....	38

Figures

Figure 1.1.	Proposed Sandigo Solar Farm regional context plan.....	2
Figure 1.2.	Proposed Sandigo Solar Farm project layout plan.....	5
Figure 1.3.	Power Conversion Unit (PCU) (Source: SMA Solar Technology, courtesy of ESCO Pacific).....	7
Figure 2.1.	Viewpoint locations.....	15
Figure 3.1.	Flowchart for assessing visual impact of a proposal (LIEMA 2013).....	16
Figure 3.2.	Risk matrix for rating visual impacts (RMS 2009).....	17
Figure 3.3.	Photomontage representative of view of development site from VP1.....	21
Figure 3.4.	Photomontage representative of view of development site from VP2.....	22
Figure 3.5.	Photomontage representative of view of development site from VP3.....	23
Figure 3.6.	Photomontage representative of view of development site from VP4.....	24
Figure 3.7.	Photomontage representative of view of development site from VP5.....	25
Figure 3.8.	Photomontage representative of view of development site from VP6.....	26

Tables

Table 1.1.	Project overview summary.....	3
Table 2.1.	Location summary of dwellings near the site	13
Table 3.1.	Sensitivity definitions.....	18
Table 3.2.	Magnitude definitions.....	19
Table 3.3.	Location summary of selected viewpoints from which the site is currently visible.....	20
Table 3.4.	Viewpoint visual impact assessment summary.....	29
Table 3.5.	Receiver visual impact assessment summary.....	30
Table 3.6.	Reflectivity of different materials (adapted from Avery & Berlin 1992).....	34

Photos

Photo 1.1.	PV Modules and Solar Array (Source: Array Technologies, courtesy of ESCO Pacific).....	6
Photo 2.1.	View from corner of residence nearest the project (site landowner), facing the site (VP4).....	11
Photo 2.2.	View from east of shed and silo west of Mitchells Road, facing the site (VP1).....	11
Photo 2.3.	View from roadside rest area west of Sturt Highway, facing the site (VP5).....	12
Photo 2.4.	View of dominating flat topography surrounding the development site (taken from south of site (VP7, D8), facing the site).....	12
Photo 2.5.	View of Galore Hill, located 15 km southeast of site (VP8).....	12
Photo 3.1.	View from VP7, directed towards the development site.....	27
Photo 3.2.	View from VP8, directed towards the development site.....	28

Abbreviations

AC	alternating current
AHD	Australian Height Datum
DC	direct current
DCP	DCP Development Control Plan
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
ESCO Pacific	ESCO Pacific Pty Ltd
Ha	hectares
km	Kilometre
kV	kilovolt
LGA	Local Government Area
m	metres
MW	megawatts
PEA	Preliminary Environmental Assessment
PCU	Power Conversion Unit
RMS	NSW Roads and Maritime Services
SEARs	Standard Secretary's Environmental Assessment Requirements
VIA	Visual Impact Assessment

1 Introduction

1.1 Context

Accent Environmental Pty Ltd (Accent) has been commissioned by ESCO Pacific Pty Ltd (ESCO Pacific) to undertake a Visual Impact Assessment for a proposed 231 ha solar farm in the Riverina region of southwestern New South Wales (NSW).

The Secretary's Environmental Assessment Requirements (SEARs) for the project, provided by the NSW Department of Planning and Environment, stipulates that the following specific EIS requirements related to visual assessment be met:

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

As part of the broader EIS for the project, a visual assessment of the proposed development must therefore be carried out to determine any likely visual impacts.

This visual impact assessment delivers an objective statement of the probable impacts on the visual environment resulting from the construction of the proposed development. The report outlines the results from site assessment, describing the present landscape character. It documents the assessment of visual impact resulting from the proposal and provides an indication for suitable management measures.

1.2 Study area

The proposed Sandigo Solar Farm project is a utility-scale renewable energy project located at Sandigo in New South Wales (NSW). The proposed 231 ha solar farm is located within the Narrandera Local Government Area (LGA) (Figure 1.1). Narrandera Shire is located in the Riverina region of south-western New South Wales and is crossed by the Sturt and Newell Highways. The nearest townships are located at Lockhart and Narrandera, 21 km south and 28 km northwest of the site, respectively.

The region's main land use is rural and consists predominantly of irrigated land, with primary income derived from agriculture. The nearest major road is the Sturt Highway, located immediately north of the site. Rural blocks bound the east, west and south of the site. Two residences are located within 1 km of the development site.

The site is located within the property of a single landholder who is engaged in agricultural and grazing activities. The land comprises gently sloping open paddocks. Due to a long history of agriculture and grazing, the development site is highly modified.

The location of the solar farm was chosen because of the relatively high solar irradiance in the region and the capacity of the TransGrid electricity networks to transmit the power generated by the solar farm.

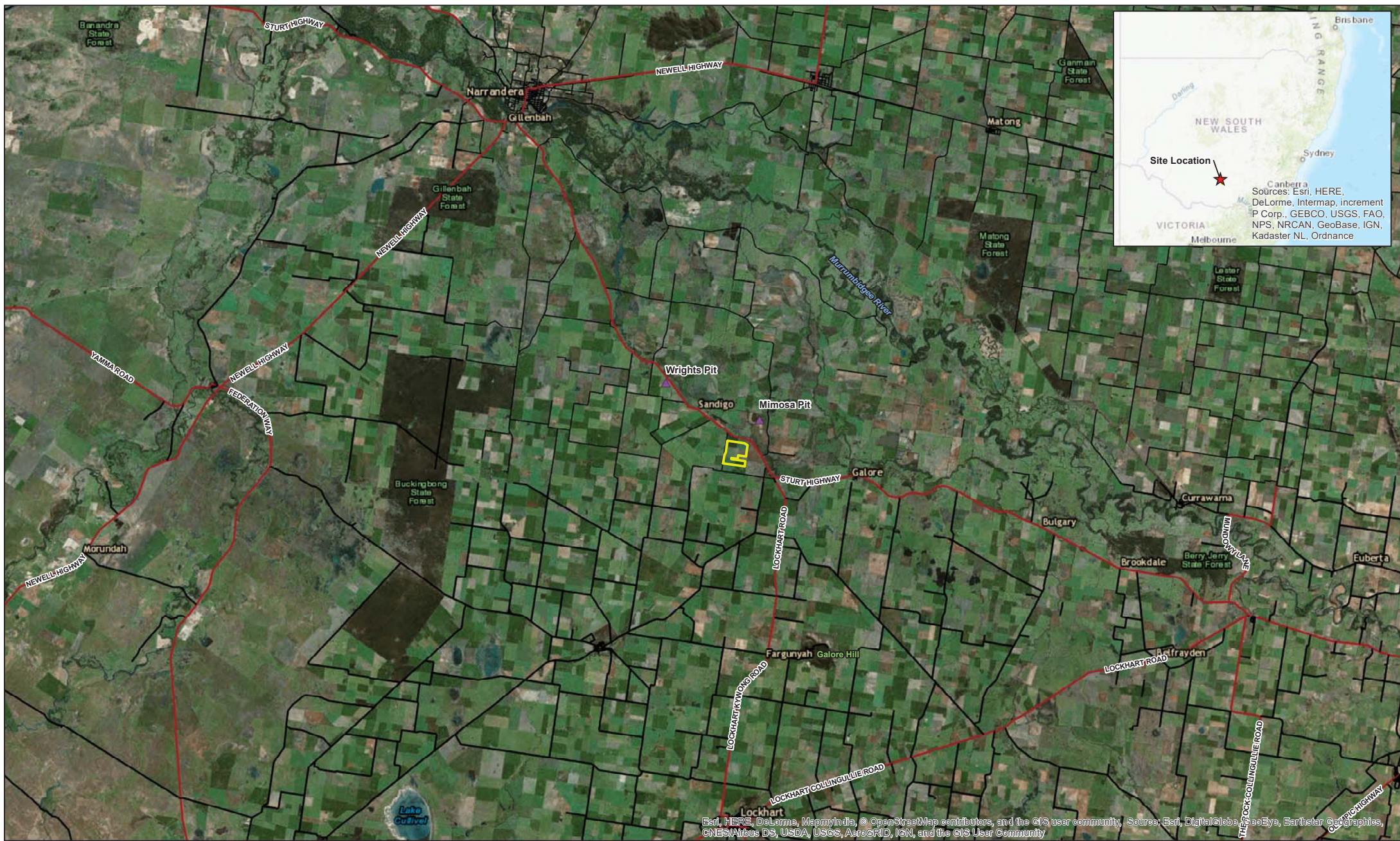
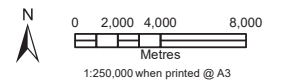


Figure 1.1

Regional Context
Sandigo Solar Farm

Legend

- Development Site
- Highway
- Main Road



1.3 Proposed development

1.3.1 Overview

The proposal is a utility scale renewable energy project that would generate up to 100 MW of clean and renewable electricity. The solar farm would comprise up to 310,000 solar photovoltaic modules, known more commonly as 'PV Modules' or 'solar panels'. The solar panels use the same type of technology used in residential solar installations, however are larger in size. General information about the project is provided in Table and the project layout is shown in Figure 1.2.

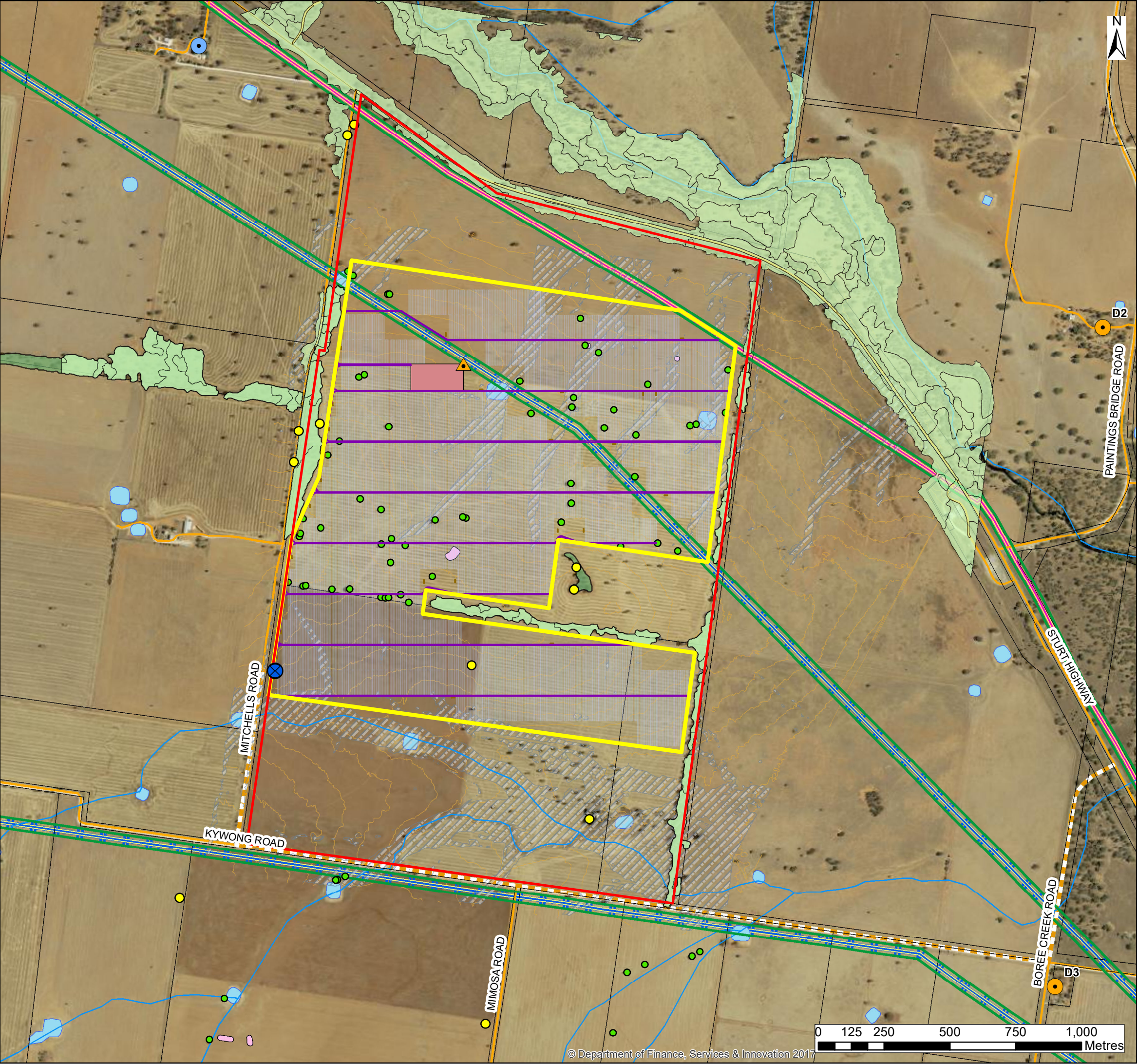
Table 1.1. Project overview summary

Address	174 Mitchells Road, Sandigo, New South Wales, 2700
Applicant	ESCO Pacific Pty Ltd
Council	Narrandera Shire Council
Titles	<ul style="list-style-type: none"> Lot 55 on Plan 754550 (168.1 ha located within development site) Lot 33 on Plan 754550 (53.4 ha located within development site) Lot 35 on Plan 754550 (9.1 ha located within development site)
Total indicative area	231 ha
Land use	Cropping, grazing – high level of ground disturbance
Capacity	Up to 100 MW (AC)
Connection	TransGrid 132 kV Transmission line #994

Key relevant visual elements and assumptions in of the proposed development include the following:

- Solar panels would be installed in regular arrays.
- Each solar panel would be fixed to a metal mounting structure, piled or screwed into the ground without the need for any concrete.
- The mounting structure would slowly and silently track (in a single axis) the horizontal movement of the sun.
- The solar panels would not exceed 4 m in height (attained early and late in the day when tilted at maximum angle towards the sun).
- Above-ground DC cabling will connect field combiner boxes approximately 1 m off the ground.
- Central inverters, step up transformers and switchgear would be located in 40 foot containers or container skid pads.
- A substation would be installed, located adjacent to the existing 132 kV transmission line
- Internal vehicle access tracks would be constructed from the entrance point of the site to each PCU and to the solar substation to allow for maintenance of the site.
- Perimeter safety fencing would be installed around the site
- A site office and maintenance building would be installed
- Temporary infrastructure would be put in place during site construction including site compounds and storage areas.
- Battery storage to be installed on site (in shipping container-like buildings)

- The approximately eight-month construction process would involve the following civil works: limited grading, compaction, stormwater drainage and sediment controls and dust suppression.



PROJECT

MAP TITLE

Title Info

Sandigo Solar Farm

Study Area

Development footprint (231 hectares)

Site Office, Maintenance Shed, Switchyard and Battery Storage

PV Solar Array

Proposed Access Point

Indicative Connection Point

Internal Access Tracks

Landholder associated with the project

Sensitive Receivers

Project Access Route (off Sturt Hwy)

Ecological Value

Native Vegetation

Scattered Trees (within project boundaries)

Threatened Species

Other Habitats

Aboriginal Heritage

Artefact Scatter

Hydrology

Watercourses

Flood Hazard (1 in 100 years)

Dam

Others

Cadastral Boundaries

Existing Easement

Essential Energy 66kV Transmission line

TransGrid 132kV Transmission Line

Roads / Tracks

Contours (1m)

ESCO

Pacific

DISCLAIMER:

This plan was prepared for the purpose and exclusive use of ESCO Pacific Pty Ltd and its subsidiaries and is not to be used for any other purpose. This map is not guaranteed to be free from error or omission. The location of features should not be relied on as exact field locations.

Datasets: OpenStreetMap

Projection: GDA94 MGA55

DATE	27/02/2018	SCALE	1:14,000	Page Size	A3
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Construction activities would be undertaken during standard hours for construction works. Any construction or commissioning activities outside of standard working hours would require approval from relevant authorities.

1.3.2 Solar panels

The solar panels and horizontal tracking systems would be mounted in rows that would be electrically connected into arrays before being inverted from DC to AC electricity via containerised power conversion units. The electricity would then be fed, via an on-site, high voltage power reticulation system, into the local electricity network.

The solar farm will be comprised of approximately 310,000 solar panels, arranged in rows or solar arrays as per Photo 1.1. The exact configuration and number of arrays will be identified during the procurement phase. The height of the solar panels will vary as they follow the sun, however they will not exceed 4 m in height. These arrays will be positioned in a north-south alignment and tilt in an east to west movement to follow the path of the sun.

The individual solar panels will be fixed onto a metal mounting structure that will be secured to the ground via piling or fastening to footings.



Photo 1.1. PV Modules and Solar Array (Source: Array Technologies, courtesy of ESCO Pacific)

1.3.3 Power Conversion Units

Within each array block is a Power Conversion Unit (PCU) which contains the central inverters, step-up transformers and switchgear which convert DC electricity collected from the panels into AC electricity for connection and distribution via the TransGrid 132 kV Transmission Line. The PCU (and associated equipment) is typically designed to be housed within a shipping container for easy transport and installation onsite. A PCU is typically 13 m long, 2.5 m wide, and 3 m high. Figure 1.3 shows a typical PCU with the relevant power conversion equipment installed. Approximately 30 PCUs will be installed on the development site.



Figure 1.3. Power Conversion Unit (PCU) (Source: SMA Solar Technology, courtesy of ESCO Pacific)

1.3.4 Step-up Transformer and substation

A main step-up transformer and associated equipment in a solar substation would convert the on-site AC reticulated 33 kV electricity to 132 kV electricity. The 132 kV supply would then be connected via high voltage cable to the TransGrid 132 kV Transmission line where it would enter the local electricity network.

1.3.5 Internal roads

Internal vehicle access tracks would be constructed to each PCU and to the solar substation to allow for site maintenance. Onsite tracks would be constructed of compacted gravel and, where required, geotextile fabric would be laid between the soil and the gravel. Internal access tracks would be up to 5 m wide to allow for the safe delivery, unloading and installation of key components such as the PCUs, PV panels, and switch equipment. The exact position of access tracks would be determined during the detailed design phase when the solar array design is finalised.

1.3.6 Site office

A site office and staff amenities building would be constructed or installed at the site. Its dimensions would be approximately 16 m long, 10 m wide, and 6 m high.

1.3.7 Maintenance building

A maintenance building would be established adjacent to the site office. The maintenance shed will be approximately 16 m long, 10 m wide, and 6 m high.

1.3.8 Site access and parking

Access to the site during construction and operation is expected to be from the Sturt Highway, located immediately north of the site, via Kywong Boree Creek Road and Kywong Faithfull Road (see Figure 1.2). Kywong Boree Creek Road is a local Council road constructed with a central sealed pavement width in the order of 6 m. Kywong Faithfull Road is a small local access road constructed with an unsealed pavement with width of approximately 5 m. No upgrade of the road widths or pavements is proposed.

A vehicle parking area would be located at the north-eastern corner of the development site, adjacent to the site office, with 10 parking spaces provided for operational and maintenance staff. Parking for

construction vehicles would be either at designated laydown areas, storage locations, or where construction activities are concentrated at any given time.

1.3.9 Site fencing

To ensure public safety, the solar farm would be fenced around the perimeter of the developable area. The security fence would be a height of 2.4 m and would feature CCTV security cameras mounted at regular intervals. The fence would typically be constructed of cyclone fencing material with a strand of barbed wire at the top to deter intruders.

1.3.10 External lighting

Lighting would be provided for security reasons and for staff and contractors utilising the site facilities during operations. External lighting at the project would be restricted to the area where the maintenance shed, permanent site office and switch yard would be located. All external lighting around buildings would be faced downwards.

1.3.11 Operation

The project is anticipated to operate for up to 40 years. Operational activities involve minimal number of personnel monitoring equipment on a daily basis, the full servicing of inverters and substation equipment on a quarterly basis, and cleaning of the solar panels at regular intervals.

At the end of its operational life, the solar farm would be decommissioned, and the site rehabilitated, with the aim of returning it to its pre-existing condition. All infrastructure would be removed, allowing the pre-existing agricultural land use activities to resume, or new land uses in the area to be established.

1.3.12 Planning context

The *Narrandera Development Control Plan 2013* (DCP) (NSC 2013) informs development such that it ties in with that of the broader Narrandera Shire Council LGA. Development should take into consideration the objectives and controls within the DCP, in addition to more specific design parameters such as those relating to industrial development. Chapter 9 of the DCP 'Industrial development controls', outlines objectives and controls for such development, including the following:

9.9 Landscaping

The objective of landscaping is to soften the appearance of hardstand areas and building bulk.

Controls

- *The front boundary of the site is to have a 1 m wide landscaping strip for planting shrubs (mature height of 2 m - 3 m).*
- *The side boundary of the site (unless a zero lot line is proposed) is to have a 2 m wide planting strip for shade trees of mature height 6 m - 8 m.*
- *A site with a secondary frontage is to have a 2 m wide planting strip for shade trees of mature height 6 m - 8 m.*

9.12 Security lighting and fencing

The objective of the fencing and lighting controls is to provide site security without unduly affecting the amenity of the area.

Controls

- *Site security fencing is to be a maximum of 2.1 m in height, using chain link with three strand angled barbed wire (if necessary).*
- *Security fencing is not to be provided in front of the primary building frontage.*

- *Razor wire is not permitted on privately owned or leased sites.*
- *Security lighting is to illuminate the subject property and not produce undue glare to nearby premises or residential areas.*

1.3.13 Activities that may have a visual impact at the site

Activities associated with the phases of the proposed solar farm development have the potential to have a visual impact on the sensitive receivers at and in the vicinity of the site. These are discussed below.

Construction

A number of activities that are likely to occur in the construction (or pre-construction) phase of the proposed development may be visible from areas surrounding the development envelop, including:

- ongoing detailed site assessment including technical investigations
- various minor civil works at access points
- construction facilities, including portable structures and laydown areas
- various construction and directional signage
- vegetation clearing, excavations and earthworks
- various construction activities including erection of solar panels with associated electrical infrastructure works, including power conversion blocks.

The majority of pre-construction and construction activities would be unlikely to result in an unacceptable level of visual impact due to their duration and temporary nature.

Operation

As the number and type activities undertaken during the operational phase of the project are much less, the impacts likely to be less and limited to the impacts of:

- the constructed solar arrays and their daily tracking of the sun
- site buildings
- fencing
- minor site signage.

As the operation phase of the proposed solar farm is expected to be 40 years, visual impacts during operations need to be carefully assessed.

Decommissioning

Decommissioning activities are anticipated to be similar to those during construction. As the decommissioning phase of the proposed solar farm is likely to be of limited duration, it is not considered likely to result in an unacceptable level of visual impact.

1.4 Methodology

This visual impact assessment is based on a combination of professional qualitative judgement and commonly accepted industry criteria and guidelines, as outlined below:

- Landscape Institute and Institute of Environmental Management & Assessment 'Guidelines for Landscape and Visual Impact Assessment' (LIIEMA 2013).
- Roads and Maritime Services' 'Environmental Impact Assessment Guidance Note. Guidelines for landscape character and visual impact assessment' (RMS 2009)
- Roads and Maritime Services' 'Beyond the Pavement: Urban Design Policy Procedures and Design Principles' (RMS 2014).

The assessment was undertaken to:

- Assess the existing visual character within the proposed solar farm site as well as the surrounding landscape.
- Determine the extent and nature of the potential visual impact of the proposed solar farm on the surrounding areas.
- Identify measures to mitigate and minimise any potential visual impacts.

The assessment involved the following general methodology:

- A desktop review of aerial photography review to identify landscape character and potential visual receptors.
- Ground-truthing of desktop research by Accent representatives on 10 January 2018. Viewpoints of the development site were selected and photographed and surrounding visual receptor views were considered and documented.
- Description and evaluation of the existing landscape character and visual environment based on ground truthing and desktop research.
- Assessment of visual impacts of project night lighting on surrounding residences, scenic/significant vistas, air traffic and road corridors.
- Assessment of the degree of occurrence of potential reflective visual nuisance (glare and glint) based on the design and the mechanical behaviour of the solar panels and the existing environment.
- Preparation of photomontages showing the completed development site from the key viewpoints.
- Visual impact assessment using a grading matrix, taking into consideration the sensitivity of the landscape and receptors and magnitude of any likely development site impact.
- Preparation of design, construction and operational mitigation and management measures, including consideration of the necessity for a site landscaping and visual screening plan.
- Consideration of community consultation outcomes (undertaken as part of the wider EIS process) throughout the assessment.

2 Existing landscape character

2.1 Purpose

This chapter outlines the existing local landscape character in order to gain a general understanding of the visual environment on which the influence of the proposal will be assessed.

2.2 Landscape description

2.2.1 Dominant character

The dominant character of the surrounding area is a rural landscape characterised by a patchwork of extensive agricultural land and vast open spaces, predominantly focussed on cropping and livestock grazing.

The surrounding properties are generally partitioned and have varying types of rural infrastructure, such as generally unsealed roads, tree plantings and fencing. At various locations in the vicinity of the development site, farm sheds, silos and other structures are present.

Photographs of the landscape surrounding the development site were taken by Accent Environmental in January 2018. The selection of characteristic images provided in Photos 2.1 to 2.5 illustrates the scenery typical of the local area and wider region.



Photo 2.1. View from corner of residence nearest the project (site landowner), facing the site (VP4)



Photo 2.2. View from east of shed and silo west of Mitchells Road, facing the site (VP1)



Photo 2.3. View from roadside rest area west of Sturt Highway, facing the site (VP5)

2.2.2 Topography

A topographic map of the development site and region is presented in Figure M. There is a minimal degree of topographic relief across the local and regional area, resulting in a largely flat landscape aesthetic. However, some gentle relief is present, as follows:

- a low ridgeline runs in an east to west direction across most of the development site
- a low ridgeline is located approximately 1.3 km to the south of the development site
- ephemeral waterways are located immediately to the south and southeast of the development site
- Sandy Creek is located approximately 500 m to the north of the development site
- Galore Hill (a prominent local lookout) is located 15 km southeast of site.

This generally vast and open regional landscape character results in a locale with a broad visual catchment. The predominantly flat nature of the terrain also contributes to high visual exposure.



Photo 2.4. View of dominating flat topography surrounding the development site (taken from south of site (VP7, D8), facing the site)



Photo 2.5. View of Galore Hill, located 15 km southeast of site (VP8)

2.2.3 Adjacent roads

The roads in the vicinity of the development site are sensitive receivers and selected viewpoints on this network have been chosen to assess the visual impacts to those receivers. The selected viewpoints are shown in Figure 2.1. The roads nearest the site from which the solar farm is expected to be visible include:

- Sturt Highway (VP3, VP5) located approximately 300 m northeast of the site
- Mitchells Road (VP1) bounding the west of the site
- Kywong Faithfull Road (VP2, VP6) located approximately 600 m to the south.

The solar farm is also expected to be partially visible from a number of other local roads located further away from the site include Kywong Boree Creek Road (VP6) to the southeast, Mimosa Road (Bankdale Road) to the south and Faithfull Road to the northwest.

2.2.4 Surrounding dwellings

Eight scattered dwellings (D1-D8) are located on rural properties within 4 km of the site. These residences are located between 980 m and 3.9 km from the site, as listed on Table 2.1 below and shown in Figure 2.1. One of the dwellings (D8) is located on a ridgeline 3.9 km south of the site.

Table 2.1. Location summary of dwellings near the site

Dwelling No.	Location	Distance and direction from development site
D1	Sturt Highway	980 m northwest of site
D2	"The Oaks" Paintings Bridge Road	1.4 km northeast of site
D3	Kywong Boree Creek Road (cnr Kywong Faithfull Road)	1.7 km southeast of site
D4	Unnamed road (off Paintings Bridge)	2.5 km north of site
D5	Bankdale Road	3.4 km south of site
D6	Faithfull Road	3.1 km northeast of site
D7	Faithfull Road	3.2 km west of site
D8	Unnamed road (west end of Bankdale Road)	3.9 km south of site

2.2.5 Recreational features

The main recreational features of the region are as follow:

- Galore Hill Scenic Reserve, located approximately 15 km south-east of the development site. This prominent reserve contains a lookout, from which the development would likely be visible (VP8).
- Buckingbong State Forest, located approximately 16 km west of the development site is beyond the development site view shed.
- Sandy Creek is located approximately 500 m to the north of the development site and is potentially also used for recreation. It is separated from the development site by Sturt Highway and topography.



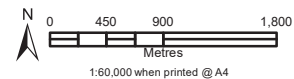
Figure 2.1

Viewpoint Locations Sandigo Solar Farm

Client: Esco Pacific
Project: Sandigo Solar Farm
Project No: AE1078
Mapping by GeoEccentric 27/02/2018

Legend

- Development Site
- Subdivision Lot
- 1 km Offset Buffer
- 2 km Offset Buffer
- Native Vegetation
- Watercourse
- Contours - 1m Intervals
- Highway
- Main Road
- Local Road
- Host Landholder
- Sensitive Receivers
- Other Dwellings
- ▲ Viewpoint Location
- ▲ Viewpoint/Photomontage Location



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2.2.6 Existing vegetation

The local and regional area is highly modified and has been largely cleared of vegetation. However, remaining vegetation includes (see Figure 1.2):

- remnant native vegetation along a section of Mitchells Road which offers intermittent screening from the west for the northern half of the site
- native trees along most of the eastern boundary of the site, offering intermittent screening from the east
- scattered native trees lining Sturt Highway which offer some breakup of the view of the site.

The screening potential of the vegetation described is reduced by a lack of understory.

3 Visual impact assessment

3.1 Grading matrix

There are two primary measurements used to determine impacts to the landscape character:

- Sensitivity of the landscape character
- Magnitude of the proposal

The visual impact of the proposal is determined using the flowchart in Figure 3.1 and risk matrix in Figure 3.2.

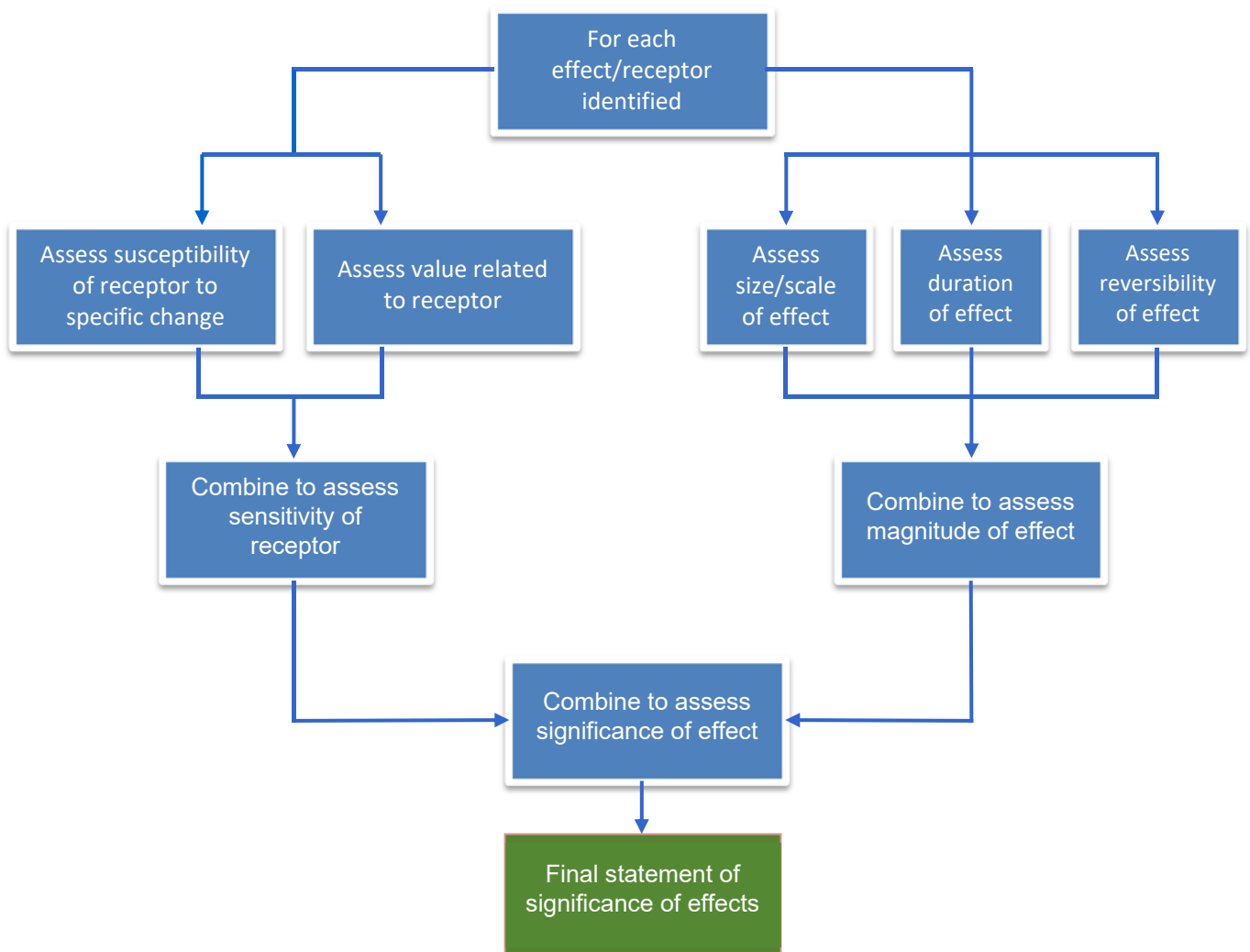


Figure 3.1. Flowchart for assessing visual impact of a proposal (LIIEMA 2013)

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

Figure 3.2. Risk matrix for rating visual impacts (RMS 2009)

3.1.1 Receivers

According to the Landscape Institute and Institute of Environmental Management and Assessment (LIIEMA), visual receivers (or receptors) are individuals and/or defined groups of people who have the potential to be affected by a proposal. Furthermore, LIIEMA states that (LIIEMA 2013):

“The zone of theoretical visibility identifies land that, theoretically, is visually connected with the proposal and this is refined by site survey to confirm the extent of visibility. But in parts of this area there will be relatively few people to experience the effects of the proposal on views. The baseline studies must therefore identify the people within the area who will be affected by the changes in views and visual amenity [are] usually referred to as “visual receptors”. They may include people living in the area, people who work there, people passing through road, rail or other forms of transport, people visiting promoted landscapes or attractions, and people engaged in recreation of different types.”

LIIEMA also says that:

“The visual receptors most susceptible to change are generally likely to include:

- *residents at home*
- *people, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focused on the landscape and on particular views;*
- *visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;*
- *communities where views contribute to the landscape setting enjoyed by residents in the area.*

Travellers on road, rail or other transport routes tend to fall into an intermediate category of moderate susceptibility to change. Where travel involves recognised scenic routes awareness of views is likely to be particularly high.”

When considering sensitivity, LIIEMA comments, saying that:

“it is important to remember at the outset that visual receptors are all people. Each visual receptor, meaning the particular person or group of people likely to be affected

at a specific viewpoint, should be assessed in terms of both their susceptibility to change in views and visual amenity and also the value attached to particular views."

For the Sandigo Solar Farm, visual receivers fall into two main categories:

- People living at residential dwellings near the development site (e.g. those listed in Table 3.1)
- People passing through by road (such as road users on the Sturt Highway, Kywong Boree Creek Road, Kywong Faithfull Road and Mitchells Road)

3.1.2 Sensitivity

Visual sensitivity refers to the character of a setting, the quality of the view and how sensitive it is to the proposed change. Combined with magnitude, sensitivity provides a measure of impact. Visual sensitivity relates to the direction and the composition of the view. Views from habitable room windows, outdoor areas of the home yard dwelling are treated as sensitive receivers. Views from residual land beyond the home yard area (such as cropping/grazing land, recreational land etc.) are treated as less sensitive receivers. The greater the distance between the visual receiver and the proposal, the lesser the visual sensitivity of that visual receiver.

The definitions in Table 3.1 are adapted from the LIIEMA (2013) and *Environmental Impact Assessment Guidance Note Guidelines for landscape character and visual impact assessment* (RMS 2009). These are generally accepted within the industry to identify visual receiver sensitivity.

Table 3.1. Sensitivity definitions

Sensitivity	Definition
High	Private residents at home with prolonged viewing opportunities, heritage properties and landscapes.
Moderate	Commercial properties, travellers on road/rail/other transport routes with an interest in their environment.
Low	Transient type spaces and people at their place of work, whose attention is on their work.
Negligible	Only a small part is discernible or at such a distance and is scarcely appreciated.

The higher the visual quality of the landscape, the greater the significance of introducing new development, and therefore the higher the sensitivity. A place with a more consistent character would also be more visually sensitive to new development than a place with less consistency.

3.1.3 Magnitude

The magnitude of a visual effect is the degree of change that the visual landscape undergoes as a result of the proposed development. It is the measurement of the overall scale, form and character of a development proposal when compared to the existing condition. Four categories are used in ranking the magnitude of a proposal (negligible, low, moderate, high).

Magnitude takes into consideration the distance between the viewer and the proposal. Judging the magnitude of visual effects takes account of the:

- scale of the change within the view with respect to the addition (or loss) of elements in the view and change to its composition. This includes the proportion of the view that is taken up by the proposed development.
- degree of change and/or integration of any new features or changes in the landscape in terms of form, scale and mass, line height, colour and texture.
- nature of the view of the proposed development and whether the views are permanent, full, partial or glimpses (LIIEMA 2013).

The categories of magnitude and sensitivity of visibility are defined in Table 3.2 below.

Table 3.2. Magnitude definitions

Magnitude	Definition
High	Substantial to total loss of key elements/features/characteristics of the baseline visual character and/or introduction of elements considered to be totally uncharacteristic of the existing landscape character
Moderate	Partial loss of/or alteration to one or more key elements/features/characteristics of the baseline visual character and/or introduction of elements that may be prominent but not considered to be substantially uncharacteristic of the existing landscape character
Low	Minor loss of/or alteration to one or more key elements/features/characteristics of the baseline visual character and/or introduction of elements that are consistent with the existing landscape character
Negligible	Very minor loss or alteration to one of more key elements/features/characteristics of the baseline visual character and/or introduction of elements that are consistent with the visual character to the existing landscape character (i.e. approximating the 'no change' situation)

3.2 Selected receivers and viewpoints

3.2.1 Receivers

As noted in Section 3.1, visual receivers are individuals and/or defined groups of people who have the potential to be affected by a proposal and whether they are sensitive depends on their susceptibility to change in views and visual amenity and also the value attached to particular views.

Based on the guidance offered by LIEMA regarding visual receivers that may be impacted by the development, Accent has identified, six roads eight dwellings, and three recreational features that may be visually impacted, as previously described in Sections 2.2.3, 2.2.4 and 2.2.5 respectively.

Sensitive receivers

Based on the LIEMA guidance, people living at dwellings are considered more susceptible to change than road users. The use of roads in the vicinity of the development site is assumed to be largely for functional purposes (e.g. movement between towns via a major highway, or access to farmland via local roads). The roads in question are not thought to be used typically by people, 'engaged in outdoor recreation' or 'visitors to heritage assets, or to other attractions' – at least, not attractions in the immediate vicinity of the development site which may cause their awareness of views to be particularly high.

Nor are people using the three recreational features considered sensitive receivers in terms of impact from the proposed development as they are either too far from the site (Buckinbong State Forest is outside the viewshed and Galore Hill Scenic Reserve and lookout is 15 km away) or screened by remnant vegetation and sufficiently distant (Sandy Creek).

Of the dwellings identified, only one is considered a sensitive receiver, that being the dwelling to the southeast of the site at the corner Kywong Faithfull and Kywong Boree Creek roads (dwelling D3). Note that the site landholder dwelling (D1) has not been considered and the dwelling at "The Oaks" Paintings Bridge Road (D2) was found during field survey to be screened from the site by remnant vegetation along Sandy Creek and the Sturt Highway.

3.2.2 Viewpoints

Viewpoints (VPs) are positions looking towards the proposal that consider views from receivers. Accent has selected eight locations for viewpoint analysis, three of which coincide with dwellings. These are listed in Table 3.3 below.

Those dwellings with no/negligible view of the development site are not included in the viewpoints in Table 3.3, which lists the selected viewpoint locations used in this assessment. Figure 2.1 shows these locations relative to the site.

Table 3.3. Location summary of selected viewpoints from which the site is currently visible

Viewpoint	Receptor location	Distance and direction from development site
VP1	Views from east of shed and silo west of Mitchells Road. On top of gentle ridge that obscures view of site from west of viewpoint	15 m west of site
VP2	Views from directly south of the development site on Kywong Faithfull Road	570 m south of site
VP3	Views from directly north of the development site on Sturt Highway	330 m north of site
VP4	Views from residence of site landowner from front gate of dwelling on Sturt Highway (D1)	980 m northwest of site
VP5	Views from roadside rest area west of Sturt Highway	1.1 km east of site
VP6	Views from junction of Kywong Boree Creek Road and Kywong Faithfull Road (D3)	1.7 km southeast of site
VP7	Views from immediately north of residence (D8)	3.8 km south of site
VP8	Views from Galore Hill, east of Lockhart Kywong Road	15 km southeast of site

3.3 View point impact assessment

3.3.1 Viewpoint 1

VP1. View from east of shed and silo west of Mitchells Road



Figure 3.3. Photomontage representative of view of development site from VP1

Impact(s)

- The solar arrays and associated infrastructure would be visible to users of Mitchells Road and part of the adjacent agricultural land and would result in a dominant change in the rural view.
- Motorists may be exposed to minor glare from the solar farm.
- Vegetation on the strip of land between Mitchells Road and the site screens most of the northern part of the site from Mitchells Road.

Sensitivity

- Prolonged viewing opportunities and an open and visible landscape character.
- Viewers are motorists along Mitchells Road with an interest in their environment and infrequent agricultural workers.
- Mitchells Road has minor traffic and no dwellings.
- The sensitivity is therefore **Low**.

Magnitude

- The solar arrays would be up to 4 m in height and would be located between approximately 10 to 80 m from Mitchells Road, and therefore in close proximity to road users.
- While approximately half of the length of Mitchells Road adjacent to the site has no significant contiguous vegetation between Mitchells Road and the development site to visually screen the solar arrays, around half of Mitchells Road does. Therefore, the visual impact to receivers at Mitchells Road needs to be considered.
- The viewpoint is on top of a gentle ridge that obscures views of the site from west of the view point.
- As the development is low and close with minimal screening and represents a significant departure from the existing rural environment, the magnitude is **High**.

Resultant Impact

High - Moderate

3.3.2 Viewpoint 2

VP2. View from directly south of the development site on Kywong Faithfull Road

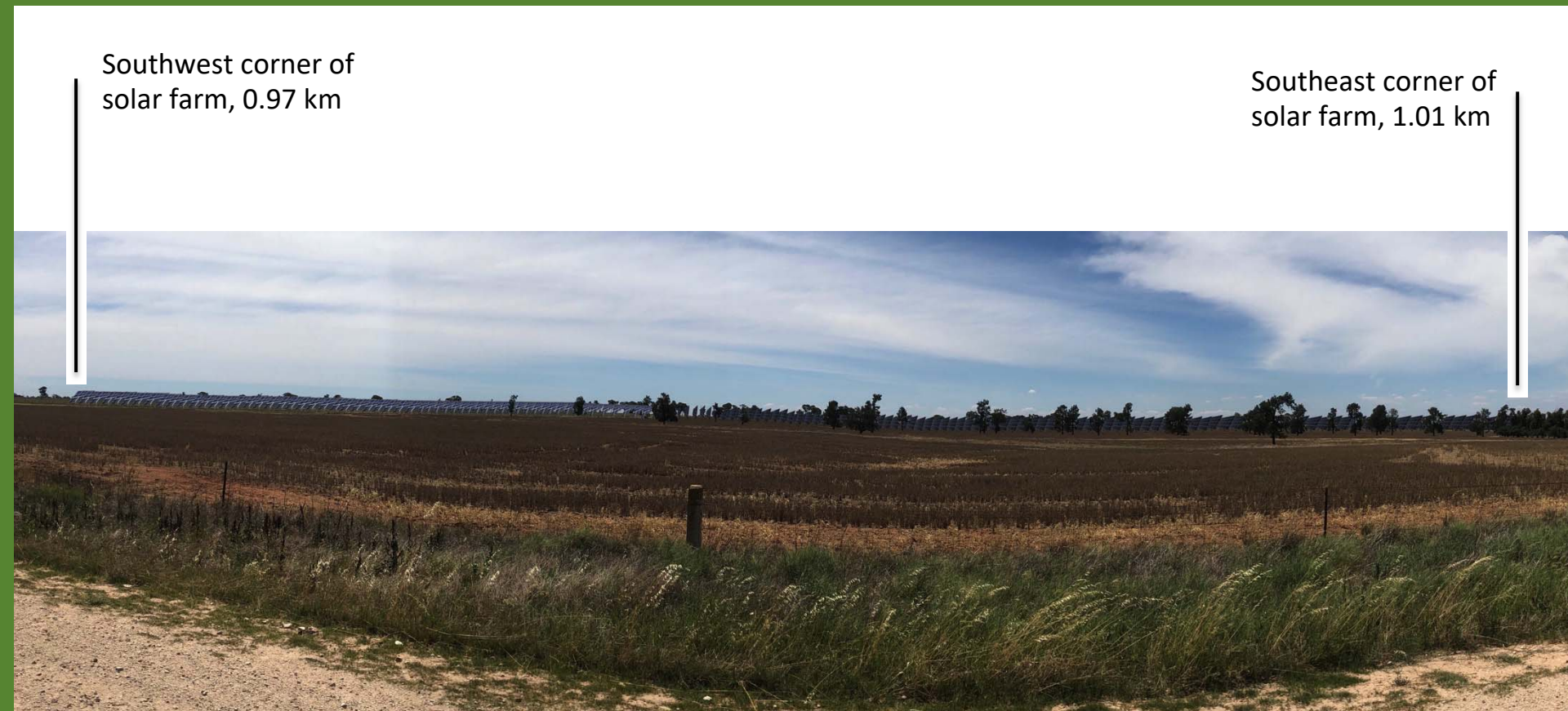


Figure 3.4. Photomontage representative of view of development site from VP2

Impact(s)

- The solar arrays and associated infrastructure would be visible to users of Kywong Faithfull Road and from the adjacent agricultural land and would result in a change in the distant rural view.
- Motorists may be exposed to minor glare from the solar farm.

Sensitivity

- Prolonged viewing opportunities and an open and visible landscape character.
- Viewers are motorists along Kywong Faithfull Road with an interest in their environment and infrequent agricultural workers.
- Kywong Faithfull Road has minor traffic and there are no dwellings in this area
- The sensitivity is therefore **Low**.

Magnitude

- The solar arrays would be up to 4m in height and would be located at least 0.97 km from the view point.
- The region is generally flat, leading to a high visibility, however there are intermittent trees between Kywong Faithfull Road and the development site to partially visually screen the solar arrays.
- As the development is low, not in close proximity to the road and has intermittent screening, it does not represent a significant departure from the existing rural environment, therefore the magnitude is **Moderate**.

Resultant Impact

Moderate – Low

3.3.3 Viewpoint 3

VP3. View from directly north of the development site on Sturt Highway



Figure 3.5. Photomontage representative of view of development site from VP3

Impact(s)

- The solar arrays and associated infrastructure would be visible to users of Sturt Highway and would result in a change in the rural view.
- Motorists may be exposed to minor glare from the solar farm.

Sensitivity

- Prolonged viewing opportunities and an open and visible landscape character.
- Viewers are motorists along Sturt Highway with an interest in their environment.
- Sturt Highway has significant traffic and there are no dwellings in this area. The sensitivity is therefore **Moderate**.

Magnitude

- The solar arrays would be up to 4 m in height and would be located at least 300 m from the highway.
- The region is generally flat, leading to a high visibility, however there are intermittent trees between Sturt Highway and the development site to partially visually screen the solar arrays.
- As the development is low, in close proximity to the highway, has intermittent screening and represents a departure from the existing rural environment, the magnitude is **Moderate**.

Resultant Impact

Moderate

3.3.4 Viewpoint 4

VP4. View from residence of site landowner from front gate of dwelling D1	
<p>Northeast corner of solar farm, 2.31 km</p> <p>Northwest corner of solar farm, 0.98 km</p> <p>Southwest corner of solar farm, 2.48 km</p>	
Figure 3.6. Photomontage representative of view of development site from VP4	
Impact(s)	
<ul style="list-style-type: none"> The solar arrays and associated infrastructure would blend into the existing tree line on the horizon, where they would be minimally visible to dwelling occupants, resulting in only a minor change in the rural view. 	
Sensitivity	Magnitude
<ul style="list-style-type: none"> Rural private residence with prolonged viewing opportunities and an open and visible landscape character and infrequent agricultural workers. The sensitivity is therefore High. 	<ul style="list-style-type: none"> The solar arrays would be up to 4m in height and would be located at least 0.98 km from the front gate of dwelling D1. The region is generally flat, leading to a high visibility, however there are trees between the dwelling and the development site to visually screen the solar arrays. As the development is low, not in close proximity to the dwelling and has screening, it does not represent a significant departure from the existing rural environment, therefore the magnitude is Negligible.
Resultant Impact	
Negligible	

3.3.5 Viewpoint 5

VP5. View from roadside rest area west of Sturt Highway



Figure 3.7. Photomontage representative of view of development site from VP5

Impact(s)

- The solar arrays and associated infrastructure would blend into the existing tree line on the horizon, where they would be minimally visible to users of the roadside rest area west of Sturt Highway, resulting in only a minor change in the rural view.

Sensitivity

- Prolonged viewing opportunities and an open and visible landscape character.
- Viewers are motorists along Sturt Highway and users of the roadside rest area with an interest in their environment
- Sturt Highway has significant traffic and there are no dwellings in this area. The sensitivity is therefore **Moderate**.

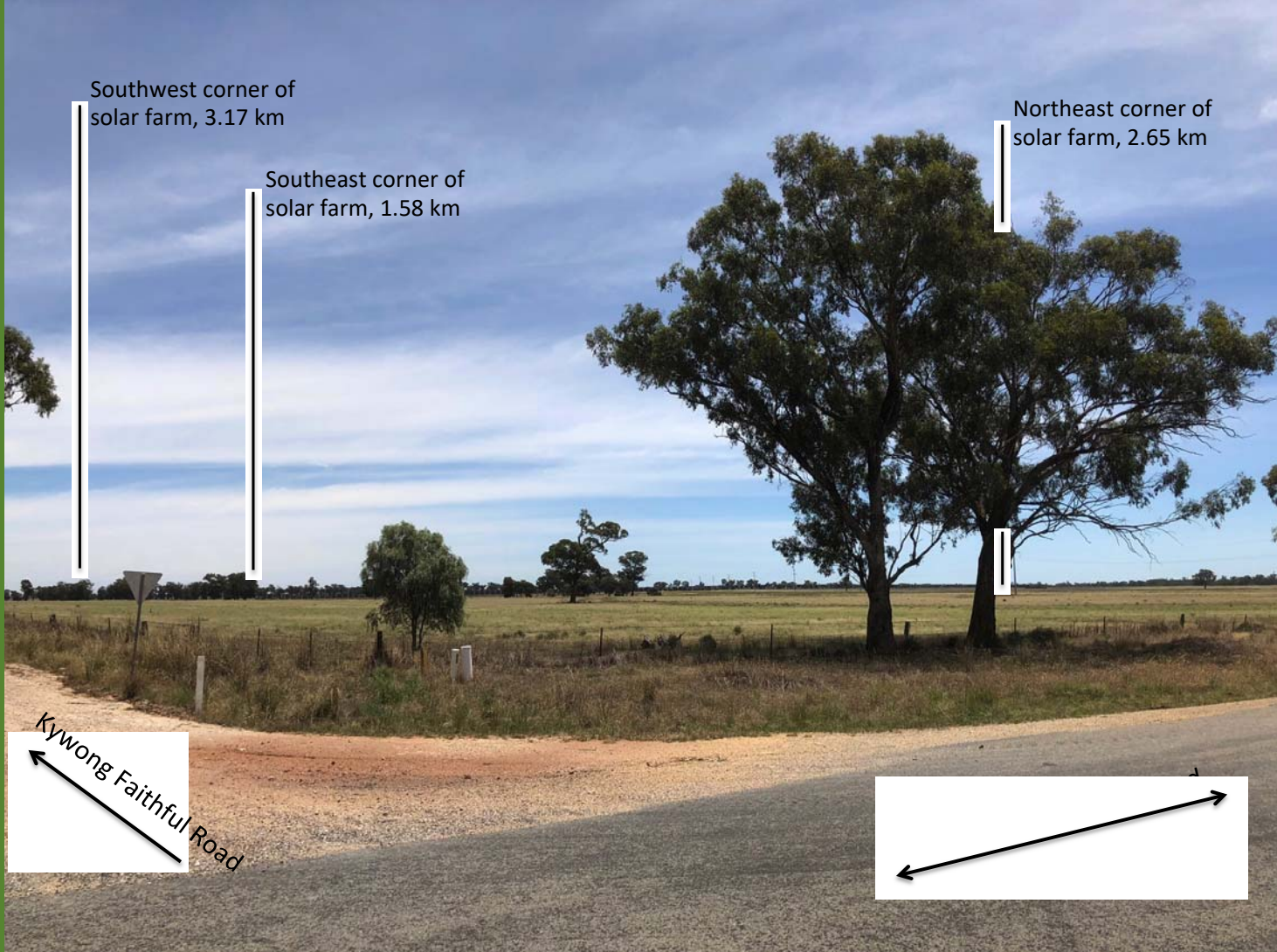
Magnitude

- The solar arrays would be up to 4 m in height and would be located at least 1.37 km from Sturt Highway.
- The region is generally flat, leading to a high visibility, however there are intermittent trees between Sturt Highway and the development site to partially visually screen the solar arrays.
- As the development is low, not in close proximity to the highway, has intermittent screening and does not represent a significant departure from the existing rural environment, the magnitude is **Negligible**.

Resultant Impact

Negligible

3.3.6 Viewpoint 6

VP6. View from junction of Kywong Boree Creek Road and Kywong Faithfull Road and dwelling D3	
	
<p>Figure 3.8 Photomontage representative of view of development site from VP6</p>	
Impact(s)	
<ul style="list-style-type: none"> The solar arrays and associated infrastructure would blend into the existing tree line on the horizon, where they would be minimally visible to dwelling occupants and road users, resulting in only a minor change in the rural view. 	
Sensitivity	Magnitude
<ul style="list-style-type: none"> Rural private residence with prolonged viewing opportunities in an open and visible landscape character, Kywong Boree Creek Road and Kywong Faithfull Road users and infrequent agricultural workers. The sensitivity is therefore High. 	<ul style="list-style-type: none"> The solar arrays would be up to 4 m in height and would be located at least 1.7 km from dwelling D3. The region is generally flat, leading to a high visibility, however there are trees between the dwelling and road and the development site to visually screen the solar arrays. As the development is low, not in close proximity to the dwelling or roads and has screening, it does not represent a significant departure from the existing rural environment, therefore the magnitude is Negligible.
Resultant Impact	
<p>Negligible</p>	

3.3.7 Viewpoint 7

VP7. View from immediately north of dwelling D8



Photo 3.1. View from VP7, directed towards the development site

Impact(s)

- The solar arrays and associated infrastructure would blend into the existing tree line on the horizon, where they would be negligibly visible to dwelling occupants, resulting in a negligible change in the rural view.

Sensitivity

- Rural private residence with prolonged viewing opportunities in an open and visible landscape character, and infrequent agricultural workers.
- The sensitivity is therefore **High**.

Magnitude

- The solar arrays would be up to 4 m in height and would be located at least 3.9 km from dwelling D8.
- The region is generally flat and residential dwelling D8 is located on a ridgeline, leading to potential high visibility, however there are trees between the dwelling and the development site to visually screen the distant solar arrays. There is also topographic screening.
- As the development is low, not in close proximity to the dwelling and has topographic and vegetative screening, it does not represent a significant departure from the existing rural environment, therefore the magnitude is **Negligible**.

Resultant Impact

Negligible

3.3.8 Viewpoint 8

VP8. View from Galore Hill, east of Lockhart Kywong Road



Photo 3.2. View from VP8, directed towards the development site

Impact(s)

- The solar arrays and associated infrastructure would blend into the existing tree line on the horizon, where they would be negligibly visible to Scenic Reserve and Lookout users, resulting in a negligible change in the rural view.

Sensitivity

- VP8 is a Scenic Reserve and Lookout with prolonged viewing opportunities in an open and visible landscape character.
- The sensitivity is therefore **High**.

Magnitude

- Solar arrays to 4 m height.
- Solar farm 15 km from the view point will be barely identifiable.
- The low nature of the development reduces effective visibility.
- As the development is low and distant, the Magnitude is **Negligible**.

Resultant Impact

Negligible

3.4 Visual impact assessment summary

In assessing the visual impacts proposed development, the following have been considered:

- the potential sensitive receivers in the vicinity of the site
- the type of sensitive receiver
- distance of sensitive receiver from site
- visibility of site from sensitive receiver
- profile of proposed infrastructure
- the of materials proposed to be used
- lighting required during construction and operation.

In summary, eight viewpoints in the vicinity of the proposed Sandigo Solar Farm have been considered and listed in Table 3.4 below and shown in Figure 2.1. Three of these viewpoints coincide with dwelling receptors, five coincide with road viewing receptors and one coincides with a scenic lookout, as listed in Table 3.5 below and shown in Figure 2.1.

Table 3.4. Viewpoint visual impact assessment summary

Viewpoint	Location viewed from	Sensitivity	Magnitude	Resultant impact
VP1	East of shed and silo west of Mitchells Road. On top of low ridge that obscures view of site from west of viewpoint	Moderate	High	High - moderate
VP2	South of site on Kywong Faithfull Road	Low	Moderate	Moderate - Low
VP3	330 m north of site on Sturt Highway	Moderate	Moderate	Moderate
VP4	Residence of site landowner from front gate of dwelling	High	Negligible	Negligible
VP5	Roadside rest area on Sturt Highway 1.1 km east of site	Moderate	Negligible	Negligible
VP6	Junction of Kywong Boree Creek Road and Kywong Faithfull Road (D2)	High	Negligible	Negligible
VP7	North of residence (D8)	High	Negligible	Negligible
VP8	Galore Hill, east of Lockhart Kywong Road	High	Negligible	Negligible

Table 3.5. Receiver visual impact assessment summary

Receiver	Location	Sensitivity	Magnitude	Resultant impact
Dwellings				
D1 (VP4)	Off Sturt Highway	High	Negligible	Negligible
D2	"The Oaks" Paintings Bridge Road	High	Negligible	Negligible
D3 (VP6)	Kywong Boree Creek Road (cnr Kywong Faithfull Road)	High	Negligible	Negligible
D4	Unnamed road (off Paintings Bridge)	High	Negligible	Negligible
D5	Bankdale Road	High	Negligible	Negligible
D6	Faithfull Road	High	Negligible	Negligible
D7	Faithfull Road	High	Negligible	Negligible
D8 (VP7)	Unnamed road (west end of Bankdale Road)	High	Negligible	Negligible
Roads				
Sturt Highway (VP3, VP5)	Between 290 m and 1.1 km north and northeast of site	Moderate	Moderate	Moderate
Mitchells Road (VP1)	15 m west of site	Moderate	High	High - moderate
Kywong Faithfull Road (VP2, VP6)	570 m south to 1.6 km southeast of site	Low	Moderate	Moderate - Low
Kywong Boree Creek Road (VP6)	1.6 km southeast of site	High	Negligible	Negligible
Mimosa Road	3 km south of site	Low	Negligible	Negligible
Faithfull Road	2.2 km northwest of site	Low	Negligible	Negligible
Recreational features				
Buckingbong State Forest	16 km west of site	High	Negligible (beyond viewshed)	Negligible
Galore Hill Scenic Reserve and lookout (VP8)	15 km south-east of site	High	Negligible (due to distance)	Negligible
Sandy Creek	500 m north of site	High	Negligible (separated by Highway and topography)	Negligible

3.4.1 Receiver with the highest visual impact rating

The receiver with the highest visual impact rating is VP1, which is Mitchells Road west of and adjacent to the site. Although existing vegetation (trees and shrubs) intermittently screen approximately half the road's adjacent length, the remaining length is not screened and the site would be highly visible from this part of the road. However, as described in Section 3.2.1, road users are receivers but in the case of this project are not considered to be sensitive receivers. In addition, the road is a local road used predominantly by local landholders and has low traffic volumes.

3.4.2 Other receivers with visual impact ratings of greater than negligible

Two other receivers have visual impact ratings of greater than negligible, those being users of Sturt Highway and Kywong Faithfull Road. However, roads users at these locations are not considered to be sensitive receivers.

Traffic along Sturt Highway at the locality is generally travelling at high speed and there are no particular existing scenic aspects to draw attention. A brief view of the solar farm to passing vehicles is likely to be considered more of a point of interest than an adverse visual impact.

Kywong Faithfull Road is used predominantly by local landholders and has low traffic volumes.

3.4.3 Receivers with a visual impact rating of negligible

None of the viewpoints that coincide with dwellings have a visual impact rating of greater than negligible and all of the other dwellings within 4 km of the development site (of which there are five) are either outside the viewshed or also have a visual impact rating of negligible.

The dwellings with negligible ratings include the only site identified as a sensitive receiver (see Section 3.2.1), dwelling D3.

3.4.4 Reducing the visual impact

As the majority of the receivers have a visual impact rating of negligible, including the sensitive receiver D3, measures taken to mitigate the project's impact on them are not considered necessary. For the three locations with greater than negligible impact ratings, mitigation measures may reduce the visual impacts on those receivers. These measures are discussed in Section 4 below. Additionally, engaging with the local community may ameliorate the impact on the sensitive receivers. This is discussed in Section 3.4.5 below.

3.4.5 Community and stakeholder consultation

ESCO Pacific has prepared a Community and Stakeholder Consultation Plan that sets out the objectives and requirements for consultation with identified project stakeholders, including the dwellings located nearest to the development site. The process of community consultation implemented by ESCO Pacific will provide a forum for project issues, including visual impacts, to be discussed.

The only dwelling (excluding the site landholder) from which the solar farm is expected to be visible is D3 (VP6) and visual impacts at this location are predicted to be negligible. ESCO Pacific has attempted to contact the D3 landholder over during the course of the project feasibility and EIS investigations. Attempted contact has included traditional mail and voicemail. To date, the landholder has not responded. ESCO Pacific will make continued efforts to contact the landholder to inform them about the project and to discuss potential issues including visual impact.

3.5 Night lighting

During operation, lighting will be provided for security reasons and for staff and contractors utilising the site facilities. External lighting would be restricted to the area where the maintenance shed, permanent site

office, and switch yard are located. All external lighting around buildings will be faced downwards and inwards to minimise impacts to neighbouring properties.

Construction activities at the site would occur from 7 am to 6 pm Monday to Friday and from 8 am to 1 pm on Saturdays (i.e. during daylight hours). However, if lighting is required during construction, it will be directed into the construction areas and placed sensitively to minimise the potential increase in light pollution for adjacent receptors.

The likely visual impacts of project night lighting on surrounding residences, scenic or significant vistas, air traffic and road corridors (particularly the Sturt Highway) in the public domain are summarised below.

3.5.1 Residences

A minor/negligible amount of light spill from the development may be visible from dwellings D2, D3 and D8 (refer to Table 2.1). Given the relatively minor amount of construction and operational lighting required for the project and the proposed management measures outlined above, it is unlikely to pose a significantly adverse impact to any dwellings.

3.5.2 Scenic/significant vistas

Development site light spill visibility from the Galore Hill Scenic Reserve and lookout is likely to be negligible and is unlikely to pose a significantly adverse impact given the relatively minor amount of lighting required for the project and that:

- it is located 15 km away
- proposed management measures are to be implemented, as outlined above
- a reduced number of receivers would be present in the Reserve/lookout at night.

3.5.3 Air traffic

Three certified aerodromes (Narrandera, Wagga Wagga, Griffith) and one registered aerodrome (Temora) are located approximately 34 km, 70 km, 100 km and 95 km from the site.

Considering the nature and relatively minor amount of construction and operational lighting required for the project, and given the proposed management measures, it is unlikely that air traffic would be affected by night lighting at the site.

3.5.4 Road corridors

Light spill from the development is unlikely to significantly adversely impact surrounding roads users, including those of Lockhart Road and Sturt Highway (refer to Table 3.3) given the proposed management measures and relatively minor amount of construction and operational lighting required for the project.

3.6 Glare and reflectivity

There are a number of factors which contribute to the occurrence of reflective visual nuisance, such as the frequency of the reflection, the type of reflection (specular versus diffuse), localised environmental impacts and the location of visual receivers. This assessment considers the following two qualities to ascertain the proposal's degree of reflective nuisance:

- The design and the mechanical behaviour of the solar panels
- The existing environment

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

3.6.1 Solar panel design

The solar panels are designed to follow the sun along a single axis to maximise energy absorption. The solar panels would remain at a stationary and constant 45-degree angle from sunrise (first light), until approximately 9:00 am when the solar panels will begin to move and follow the path of the sun. Likewise, from approximately 4:30 pm until sunset (last light), the solar panels will remain at a constant -45-degree angle.

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

Photovoltaic solar panels are designed to absorb the highest amount of solar energy possible to generate the maximum amount of electricity. The potential for glare associated with non-concentrating photovoltaic systems which do not involve mirrors or lenses is relatively limited. Refer to Table 3.6 for a comparison of solar panels against other materials/surfaces.

Photovoltaic solar panels reflect approximately 3-20% of the light received, depending on the angle of incidence. They generally do not create noticeable/nuisance glare compared with other commonly existing surfaces such as roofs and are less reflective than other naturally occurring elements (refer to Table 3.6).

Within the pastoral context of the proposal, grazing landscapes, crops and water share a similar or higher reflective value than photovoltaic solar panels, therefore the proposal would not represent a significant departure from the existing visual environment in terms of glare.

Additional solar farm infrastructure that may cause glare or reflections depending on the sun's angle, including the following (note that this infrastructure would be relatively dispersed and unlikely to present a glare or reflectivity hazard to motorists or aircraft):

- steel array mounting structures - array mounting would be steel or aluminium
- temporary site offices, sheds, containerised inverter stations
- on-site substation
- perimeter fencing
- permanent staff amenities.

The topography of the site and local area is largely flat and there are not many nearby opportunities to view the site from a higher position. The nearest airfields are located in Narrandera, approximately 33 km to the northwest of the site and Lockhart, approximately 23 km to the south of the site. However, when viewed from above from aircraft or tall buildings, photovoltaic solar panels appear dark grey and do not cause a glare or reflectivity hazard. It is therefore unlikely that air traffic would be affected by solar panel glare.

Table 3.6. Reflectivity of different materials (adapted from Avery & Berlin 1992)

Material	Percentage reflected
Solar Panels	3-20
Fresh Snow	80-95
Thick Cloud	70-80
Water (sun near horizon)	50-80
Old Snow	50-60
Light Soil	50-60
Thin Cloud	20-30
Dry Soil	20-25
Wet Soil	15-25
Deciduous Forest	15-20
Dark Soil	5-15
Asphalt	5-10
Crops	10-25
Grazing / grass	10-20
Coniferous Forest	10-15
Water (sun near zenith)	3-5

3.6.2 Impact on visual receivers

In summary, considering the relatively minimal glare reflecting off the photovoltaic solar panels, and their mechanical nature as they follow the sun, the level of visual nuisance or glare resulting from the proposal would have a minimal influence on locally positioned visual receivers.

4 Visual impact assessment management and mitigation measures

4.1 Objectives and principles

The following general project objectives aim to maintain the existing landscape character where possible, via strategic and practical measures:

- Integrated rural infrastructure/landscape design that permits the landscape to take precedence over the built form.
- Strengthen the vegetated character of the proposal area and express the rural and bushland nature of landscaping.
- Preserve screening to residents within the affected radius immediate area.
- Any urban design features should reflect and be sympathetic to the existing historic, cultural and natural character of the area.
- Design lighting so not to negatively impact adjacent land uses (e.g. no light spill into adjacent rural properties containing dwellings).

The following landscape design principles would be applied to the proposal:

- Maximise the retention of existing visual screening opportunities.
- Revegetation of areas disturbed by construction work, where possible.
- Consider the potential to reflect similar vegetation types found in the area.
- Use materials and colours that reflects the existing urban design character and palette.

Although the visual impacts of the proposed project have been assessed as low, management measures have been proposed in the following sections to ensure that visual impacts are minimised during both construction and operation.

4.2 Design phase measures

Based on the visual impact assessment, the site will not be visually intrusive from the nearest sensitive receptors (the closest dwellings and roads to the solar farm infrastructure). This is shown from VP4 and VP6 which show the site fading into the existing tree line, with the development site only being readily visible from the roads. Accordingly, landscaping and visual screening treatments are not considered to be required.

The following detailed design measures should be adopted to reduce the visual impact of the project:

- Apply urban design principles and objectives during detailed design phase.
- Investigate colour combinations for infrastructure items to aid visual obscurity.
- Ancillary structures: minimise reflective surfaces with a preferred use of muted colours.

4.3 Construction phase measures

The following measures will be implemented to minimise visual impacts during construction:

- Demarcation and exclusion fencing will be installed around trees and vegetation to be retained.
- Minimising light spill from the development into adjacent visually sensitive properties by directing construction lighting into the construction areas and ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution.
- Temporary hoardings, barriers, traffic management and signage should be removed when no longer required.
- The site to be kept tidy and well maintained, including removal of all rubbish at regular intervals. There should be no storage of materials beyond the construction boundaries

4.4 Operation phase measures

The following measures will be taken to minimise visual impacts during the operation phase of the project:

- Restrict external lighting to the area where the maintenance shed, permanent site office, and switch yard are located. All external lighting around buildings to be faced downwards and inwards to minimise impacts to neighbouring properties.

4.5 Decommissioning phase measures

The following measures will be taken to minimise visual impacts during the decommissioning phase of the project:

- A Decommissioning Management Plan will be implemented to return the site to its pre-existing condition.

5 Conclusion

This visual impact assessment has qualitatively assessed the visual impact of the development site from major viewpoints and receptors, finding that the impacts range from negligible to moderate-high. However, the degree to which the change to the landscape will actually be perceived will depend on affected individual receptors' sensitivities, which cannot be predicted at this stage, although it will be considered as far as practicable via ongoing community consultation as part of the wider EIS and during project planning and development.

The dominant viewpoint of the development site is the Sturt Highway and the lesser used Mitchells Road, rather than more sensitive residential receivers. As such, the standard design, construction and operational recommendations outlined in this assessment are considered sufficient to assist with maintaining the landscape character of the local area. No project specific landscaping and visual screening plans have been recommended, as the site will not be visually intrusive from any highly sensitive receptors.

In terms of reflectivity, considering the relatively minimal glare reflecting off the photovoltaic solar panels, and their mechanical nature as they follow the sun, the degree of visual nuisance resulting from the proposal would have a minimal influence on locally positioned visual receptors and it is unlikely that air traffic would be affected.

6 References

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