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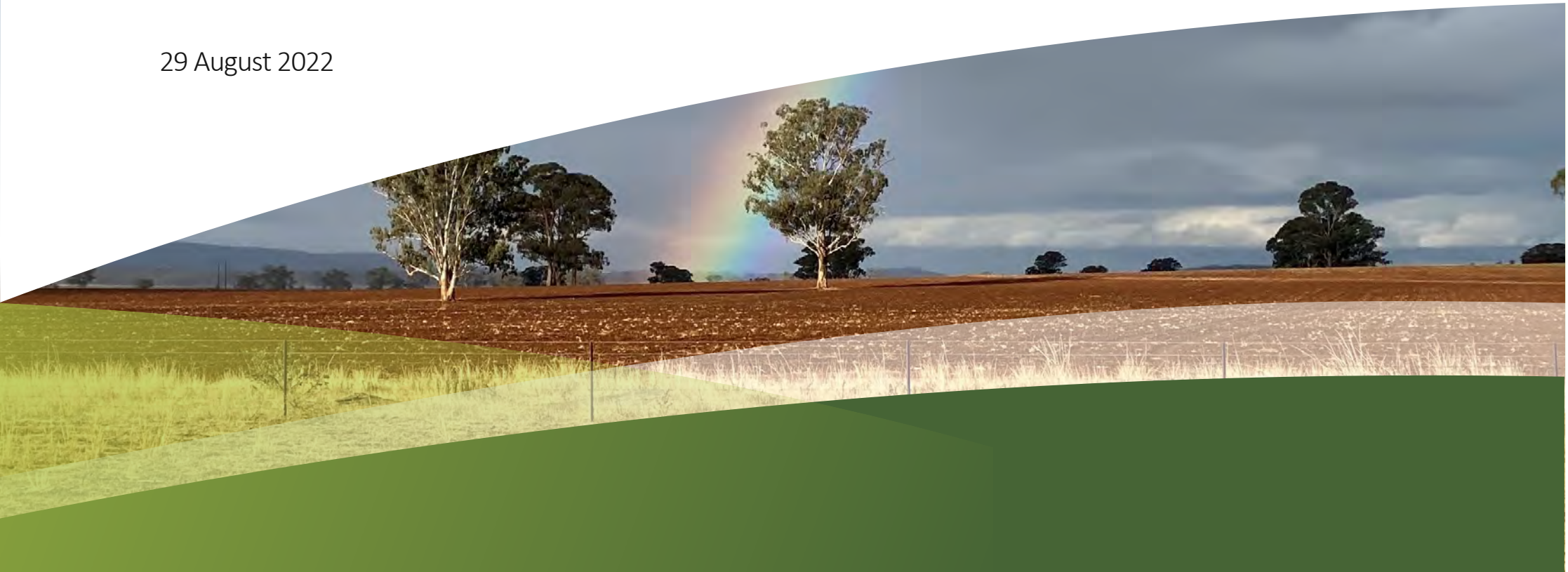
Appendix L:
Visual Impact Assessment

Visual Impact Assessment

Peninsula Solar Farm

29 August 2022



Visual Impact Assessment
Peninsula Solar Farm

AE1173.1
August 2022

Version V4			
Issued to			
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Previous versions			
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Figures

Tables

ABBREVIATIONS

AC	alternating current
BESS	battery energy storage system
DC	direct current
DCP	Development Control Plan
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry and Environment (now Department of Planning and Environment)
EIS	environmental impact statement
ha	hectares
kV	kilovolt
LGA	Local Government Area
m	metres
mAHD	metres above the Australian Height Datum
MW	megawatts
PCT	plant community type
PCU	power conversion unit
SEARs	Secretary's Environmental Assessment Requirements
SF	solar farm
TfNSW	Transport for New South Wales
VIA	visual impact assessment

GLOSSARY

Applicant	Entity applying for development consent under the EP&A Act, in this case, Edify Energy (may also be termed proponent).
alternating current	Alternating current (AC) is an electric current which periodically reverses direction, in contrast to direct current (DC) which flows only in one direction.
direct current	An electric current flowing in one direction only.
project site	The project site, is the area within which the solar arrays, BESS, substation, office and supporting facilities will be located.
magnitude	The measurement of the scale, form and character of a development proposal when compared to the existing condition. In the case of visual assessment this also relates to how far the proposal is from the viewer. Combined with sensitivity, magnitude provides a measurement of impact (TfNSW 2020a).
mitigation	The action of reducing the severity and magnitude of the impacts of the proposed project.
power conversion unit	Device used to convert power from one form to another e.g. from DC to AC or changing the voltage or frequency.
project site boundary	The boundary around the project site.
SCADA system	SCADA is an acronym for supervisory control and data acquisition. SCADA refers to an industrial computer system that monitors and controls a process. In the case of the transmission and distribution elements of electrical utilities, SCADA will monitor substations, transformers and other electrical assets.
sensitivity	The sensitivity of a landscape character zone or view and its capacity to absorb change of the nature of the proposal. In the case of visual impact this also relates to the type of viewer and number of viewers (TfNSW 2020a).
substation	A set of equipment reducing the high voltage of electrical power transmission to that suitable for supply to consumers.
transformer	Transformers are used to increase or decrease the alternating voltages in electric power applications.

1 INTRODUCTION

1.1 Project overview

Accent Environmental Pty Ltd (Accent) has been commissioned by Edify Energy Pty Ltd (Edify) to undertake a visual impact assessment to support a Development Application (DA) for the construction and operation of the utility-scale Peninsula Solar Farm (Peninsula SF) located southeast of the township of Forbes in New South Wales (NSW).

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

> *'Visual – including a detailed assessment of the likely visual impacts (including any glare, reflectivity and night lighting) of all components of the project (including arrays, transmission lines, substations and any other ancillary infrastructure) on surrounding residences and key locations, scenic or significant vistas, air traffic and road corridors in the public domain and provide details of measures to mitigate and/or manage potential impacts (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 has therefore been 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 proposes suitable management measures.

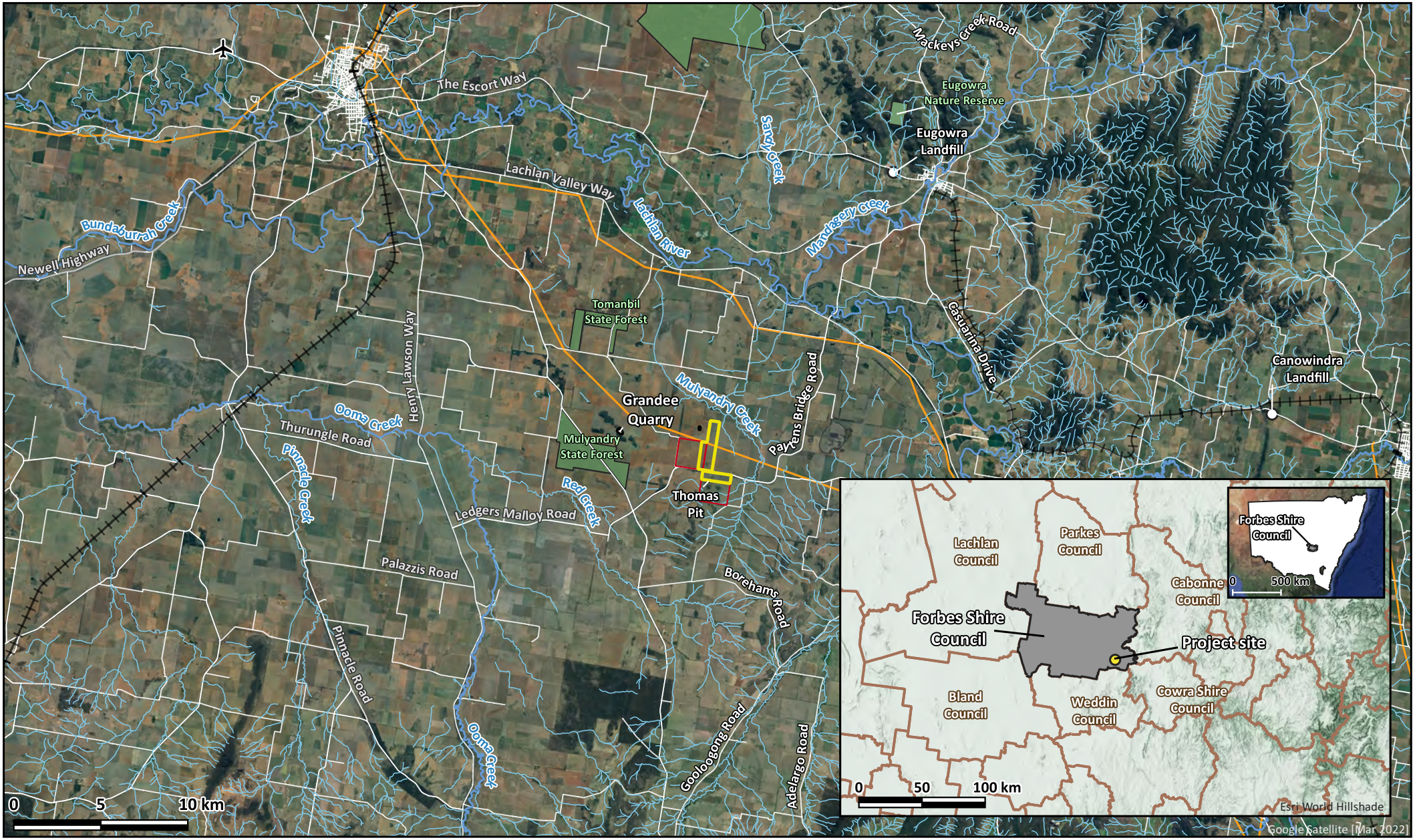
1.2 Study Area

The proposed Peninsula SF is located within the Forbes Shire Council (FSC) local government area (LGA), as shown on Figure 1.1. The FSC LGA is located within the Central West Orana region of New South Wales. The site is located 27 km southeast of Forbes.

The region's main land use is for agriculture (FSC 2021). The nearest major road to the Peninsula SF is the Lachlan Valley Way approximately 8 km northwest of the project site.

The project site is located on the property of two landholders and occupies 290 ha of rural land. The project footprint occupies 210 ha of land within the project site, with the remaining land excluded from development, primarily to minimise environmental impacts. Due to a long history of agriculture and grazing, the site is highly modified.

The site is generally flat, with undulating rises present towards the southern section of the site, south of Paytens Bridge Road, and a single rise in the northern section of the site.



- Project site
- Lot boundary
- State Forest and Nature Reserve
- Quarry
- Landfill site
- Existing transmission line
- Airport
- Railway
- LGA boundary (inset map)
- Main watercourse
- Tributary

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AE1173.1 Peninsula SF

Figure 1.1 Local context

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Additional data: NSW RoadSegment, NSW Hydroline, NSW ElectricityTransmissionLine, NSW_Six_Forbes_Lot_Cadastral_data NSW_FOI_Transport_Facilities_Airport, NSW Transport Theme - Railway, NSW_LGA_Boundary_polygon

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1.3 Proposed development

1.3.1 Overview

The proposed Peninsula SF is a utility scale solar energy development that would generate up to 80 MW (AC) of renewable electricity. Solar energy will be captured by thousands of solar photovoltaic modules, known more commonly as solar panels.

The project is a major infrastructure development that is expected to create up to 250 jobs during construction. Access to the project area will be via Paytens Bridge Road.

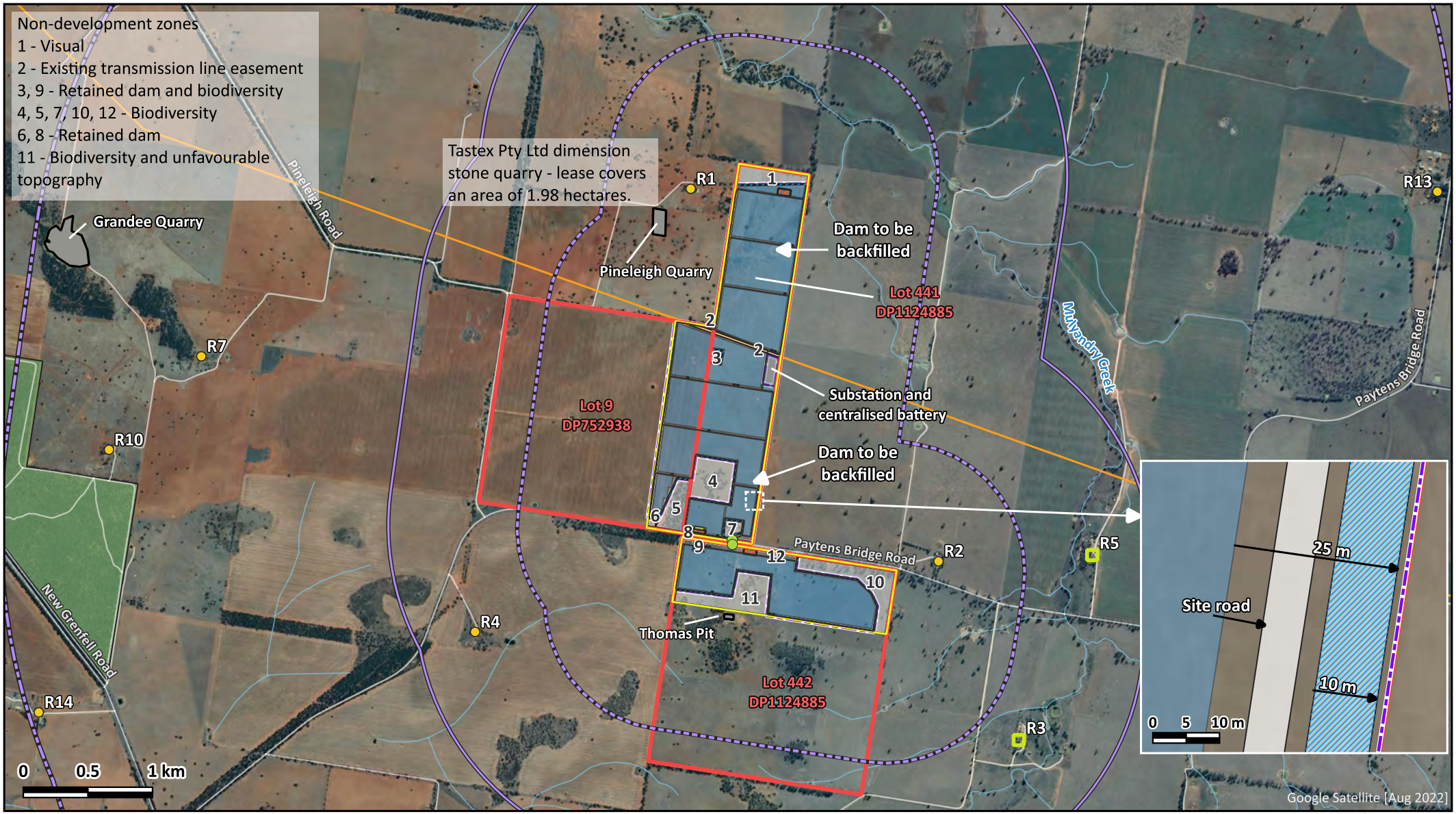
General information about the project is provided in Table 1.1 and the project layout is shown in Figure 1.2.

The project site is comprised of two sections, one north of Paytens Bridge Road and the other south of the road. Key visual elements of the project include:

- solar panels interconnected to form solar arrays
- inverters and integrated transformers combined in prefabricated enclosures (one inverter and transformer for each solar array)
- metal mounting structures
- above-ground (and underground) DC cabling
- central 33 kV switchboard (ring main unit)
- battery energy storage system (BESS) units comprising sealed lithium-ion batteries housed in enclosures that resemble shipping containers in dimensions and appearance and are up to 3 m in height

Table 1.1 Project overview summary

Address	Paytens Bridge Road, 27 km southeast of Forbes within the Central West Orana region of NSW
Applicant	Edify Energy Pty Ltd, ABN 85 606 684 995 Level 1, 34-35 South Steyne, MANLY NSW 2095
Council	Forbes Shire Council
Titles	Lot 441 DP 1124885 Lot 442 DP 1124885 (part) Lot 9 DP 752938 (part)
Total indicative area	Project site: approximately 290 ha Project footprint: approximately 236 ha
Land use zoning	Rural zoned land (RU1)
Land use	Rural land use, predominately grazing and cropping
Proposed capacity	Solar farm capacity 80 MW BESS capacity 80 MW/160 MWh
Connection	Via a new underground or overhead transmission line from the on-site substation to the existing Forbes-Cowra TransGrid 132 kV Transmission line, which crosses the site.
Capital investment value	A$194,894,844 (exclusive of GST)



AE1173.1 Peninsula SF

Figure 1.2. Proposed site layout

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Additional data: NSW RoadSegment, NSW Hydroline, NSW ElectricityTransmissionLine, NSW_Six_Forbes_Lot, MinView Min_occ_all_construction

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- a high voltage (HV) substation, fitted with lightning rods, to connect the solar farm to the national transmission network
- a prefabricated operations and maintenance (O&M) building.
- permanent staff and contractor car parking area
- permanent all-weather site access (north and south off Paytens Bridge Road) and an access road approximately 10 m wide leading to the office and substation
- internal vehicle access tracks (4 m wide) leading to solar arrays and power control units (PCUs)
- perimeter safety fencing and a fixed, closed-circuit television (CCTV) system
- temporary site compound, lay-down area, and equipment storage areas during construction.

The high voltage substation would be installed adjacent to an existing TransGrid 132 kV transmission line that crosses the project site from southeast to northwest. The BESS units will either be distributed in groups throughout the site (decentralised) or consolidated in a single location next to the substation (centralised).

1.3.2 Solar arrays

The proposed solar arrays will be 70 to 90 m long and 7 m apart. The height of the solar panels will vary across the day as they track the path of the sun; however the maximum height will not exceed 4.2 m. The solar arrays will be positioned in a north-south alignment and tilt along a single axis in an east to west movement. Each solar panel will be fixed to a metal mounting structure, piled or screwed into the ground without the need for any concrete.

An example of solar panel arrays is shown in Figure 1.3 and a visual representation of the solar farm components is shown in Figure 1.4.

Figure 1.3 An example of solar farm array blocks

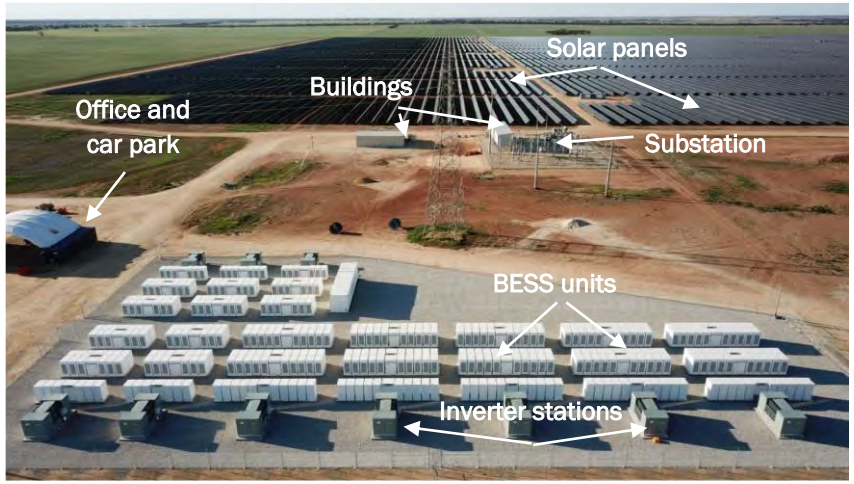


Figure 1.4 Visual representation of site components

1.3.3 Battery storage

Lithium-ion batteries will be installed in a secure, climate-controlled BESS unit with a rating of up to 80 MW/160 MWh. The BESS units shown in Figure 1.4 are an example of a centralised BESS.

1.3.4 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 132 kV TransGrid Transmission Line.

1.3.5 Substation

The high voltage substation will be located next to (south of) the existing 132 kV transmission line, on the eastern boundary of the site (see Figure 1.2), and have a footprint of roughly 120 m x 120 m. The maximum height of the substation is not expected to exceed 10 m. The substation will be fitted with lightning towers to a height of approximately 12 m.

1.3.6 System monitoring

The performance of the solar power plant will be monitored through a SCADA system that will report to staff both on- and offsite. The system will be capable of notifying staff of system issues and failures.

1.3.7 Site access and internal roads

The site entry points will be from the Paytens Bridge Rd with one access to the northern section of the site and another access to the southern section of the project site (see Figure 1.2).

1.3.8 Operations and maintenance building

An operations and maintenance building will be constructed at the site. The dimensions of the building are expected to be approximately 10 m by 8 m and single storey, with a height of up to 5 m. The building is expected to be constructed using neutral Colourbond style materials.

1.3.9 Parking

During operations, operational and maintenance staff vehicles will be accommodated on-site within a vehicle parking area located adjacent to the site office. During construction, vehicles will be parked either at designated laydown areas, storage locations, or where construction activities are occurring.

1.3.10 Site fencing/security

To ensure public safety, security fencing will surround the project site using a single high security fence including screening around entire project site. The height of the fence will be 2.3 m. In addition, to ensure public safety, the substation and the adjacent BESS (if centralised) would have its own security fence.

Site fencing would typically be constructed of cyclone fencing material and would feature CCTV security cameras mounted at regular intervals.

1.3.11 External lighting

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

1.3.12 Operation

During the operational phase of the project, approximately five full-time equivalent personnel will be required to support the project's operation. The primary activities conducted on site will include day-to-day routine operations, maintenance of infrastructure, and general site maintenance and security. Operation of the solar farm will also likely be supported by local contractors for tasks such as repairs, minor works, weed/vegetation management, fencing and cleaning.

1.3.13 Planning context

Forbes Shire Council Development Control Plan (DCP) 2013 (V2) applies to all industrial development (including light industrial development) within the Forbes Shire. The objectives of the DCP are to:

- ensure that industrial developments do not have an adverse impact on surrounding land use or the environment
- ensure that industrial developments contribute to and enhances the visual and landscape character of the Forbes Shire
- ensure good access, circulation and loading facilities on sites and adequate services and the disposal of waste.

Table 1.2 summarises the relevant objectives of the DCP in relation to visual amenity and landscaping, the standards that apply to the Peninsula SF development, and Edify's response.

Table 1.2 Forbes Shire Council DCP 2013 (V2): Standards for Industrial Development

Objective (and DCP section number)	Standard	Edify response
11.7 Site Coverage and Floor Space Ratio		
• To **restrict the overdevelopment of land within the industrial area.** • **To ensure satisfactory provision of all necessary facilities in conjunction with industrial development are contained within the project site.**	• The floor space ratio shall not exceed 1:1 with a maximum site coverage of 50%.	The proposed project will readily comply with this requirement.
11.9 Storage Areas		
• To minimise the visual impact of storage areas associated with industrial developments. • To promote the urban amenity within industrial areas.	• Any open storage areas must be screened from view of roadways.	Design of storage areas will be consistent with the required standard.
11.10 Car Parking		
• To ensure adequate car parking is provided to satisfy the needs of development contained within the project site.	• Parking areas are to be segregated from non-traffic areas by kerbs, logs, bollards or barriers. Parking spaces are to be defined by painted lines or other similar approved means.	Design of car parking facilities will be consistent with the required standard.
11.11 Landscaping		
• To provide adequate areas for site landscaping in order to soften the potential impacts (in particular visual impact) of industrial development. • To ensure Council has adequate information to consider and assess proposed landscaping	• All development applications for new industrial developments are to be accompanied by a Landscape Plan.	A Landscape Plan will be prepared during the detailed design phase and submitted prior to construction.
	• Council will hold a “landscape bond” to be provided by the developer for the provision, and maintenance of landscaping. The “landscape bond” is to be in the form of	Edify acknowledges this requirement.

Objective (and DCP section number)	Standard	Edify response
to be provided in conjunction with development applications. • To provide a reference plan for the installation and implementation of landscaped areas. • To encourage the use of native vegetation for its tolerance to the climate of Forbes including hot, dry summers and cold, frosty winters. • To retain where possible all existing native vegetation.	Cash, a Bank Guarantee or Bank Cheque. To be made in the favour of Forbes Shire Council, to the value of $2,000 or 5% of the estimated cost of the entire development, whichever is lesser amount. The landscape bond will be applied as a condition of development consent, to be released, upon request, a minimum 12 months after the issue of an "Occupation Certificate".	
	• Industrial developments upon vacant land shall provide a minimum 10% of the site for landscaping.	This standard in considered inappropriate for a solar farm.
	• All landscaped areas are to use predominantly native vegetation. A minimum 80% of landscaping shall utilise native vegetation. A list of recommended plant species is identified in Appendix 2 [of the DCP]. These plant species have been shown to be suited to the climate of the Central West many are native to the Forbes district.	At least 80% of landscaping vegetation will be native.
	• Landscaping proposed in Saline areas shall use a minimum 80% Salt tolerant and water wise plant species. Recommended plant species for such situations are identified in Appendix 3.	Not applicable to project site.
	• All existing native vegetation is to be retained and where possible enhanced with additional plantings and landscaping.	Native vegetation patches have been excluded from project footprint.
	• Existing street trees shall be maintained and replicated. The spacing of such trees shall be a minimum of 1.5 times the mature canopy of the proposed tree and a maximum 2 times the mature tree canopy.	Existing trees along verge of Paytens Bridge Road to be retained, except for some potential clearance during site access points construction.

Objective (and DCP section number)	Standard	Edify response
11.12 Materials		
• **To maintain a consistency in the streetscape.** • **To protect the heritage qualities of the building and/or immediate area.**	• New development shall be compatible with the character of an existing building and that of immediately surrounding properties. • Where there is no prevailing character, new development shall respect the qualities of surrounding properties in integrating new development within the industrial area. • Highly reflective material, cladding or finishes, such as Zincalume, are not permitted as a wall cladding.	Compatibility with buildings on surrounding properties will be considered in building design and highly reflective materials will not be used.

1.3.14 Activities and structures that may have a visual impact

Activities and structures associated with the phases of the proposed solar farm development have the potential to have a visual impact on sensitive receivers 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 project site, including:

- ongoing detailed site assessment including technical investigations
- various minor civil works at the site access point
- construction facilities, including portable structures and laydown areas
- various construction and directional signage
- excavations and earthworks
- construction-related vehicles and equipment gaining access to site from Paytens Bridge Road
- various construction activities such as erection of solar panels and associated electrical infrastructure works
- the use of lighting at night to assist with construction activities and/or site security.

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/frequency and type of activities undertaken during the operational phase of the project are minimal, the impacts will be associated less with site activities and more with the presence of structures on site, as follows:

- the presence and operation of the solar arrays and their daily tracking of the sun
- the presence of the BESS units and substation
- the presence of associated infrastructure such as inverter enclosures, gathering and transmission lines, and operations and maintenance building
- the presence of internal access roads
- the presence of fencing and minor site signage
- vehicles and equipment gaining access to site for operations and undertaking maintenance activities

As the operation phase of the proposed solar farm is expected to last for 30 years, visual impacts during operations need to be carefully assessed.

DECOMMISSIONING

At the end of the project's operational life, the project site will be decommissioned. During decommissioning, all above ground infrastructure (and below ground infrastructure to a depth of 1000 mm) will be removed. Key elements of project decommissioning with associated visual impacts are expected to include:

- disconnection of the BESS from the TransGrid connection point at the substation
- disconnection and removal of the solar panels
- removal of all buildings and equipment, with materials recycled wherever possible
- removal of steel framework/supports and cabling for recycling
- removal of underground infrastructure

- removal of fencing (unless requested otherwise by the landholder or relevant authorities)
- site rehabilitation, remediation (if required), and return to pre-existing land use (unless otherwise agreed with the landholder or relevant authorities).

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).
- Transport for NSW (TfNSW) *Guideline for landscape character and visual impact assessment* (TfNSW 2020a).
- TfNSW *Beyond the Pavement 2020: Urban design approach and procedures for road and maritime infrastructure planning, design and construction* (TfNSW 2020b).
- Department of Planning and Environment (DPE) *Draft Large-Scale Solar Energy Guideline* (Appendix A) (DPIE 2021) (used to undertake preliminary visual assessment).

The assessment was undertaken to:

- assess the existing visual character within the proposed solar array, BESS and associated buildings and site infrastructure as well as the surrounding landscape
- determine the extent and nature of the potential visual impact of the proposed solar array, BESS and associated buildings and site infrastructure 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 to identify landscape character and potential visual receptors
- ground-truthing of desktop research by Accent representatives on 11 to 12 May 2021, during which viewpoints of the project 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 proposed solar arrays, BESS, buildings and the existing environment
- preparation of photomontages showing the completed project 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 site development impacts
- 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 grazing. The area is mapped as land and soil capability (LSC) Class 3 (46.0%), Class 4 (27.4%) and Class 5 (26.7%) land (eSPADE 2021c). Remnants of native vegetation remain on undulating rises within the project area (see Photos 2.3 and 2.5) and some regrowth occurs along roadsides and fence lines.

Photographs of the landscape surrounding the project site were taken by Accent Environmental on 11 to 12 May 2021. The selection of images provided in Photos 2.1 to 2.6 illustrates the scenery typical of the existing landscape and proposed site from road and paddock vantage points.

2.2.2 Topography

Most of the project site is flat with low, undulating rises present towards the southern section of the site (south of Paytens Bridge Road) and a single low hill in the southern part of the northern section of the site (north of Paytens Bridge Road).

2.2.3 Existing electrical infrastructure

In addition to local power transmission lines to residences, the project site and broader area is also host to the TransGrid 132 kV, Forbes to Cowra transmission line that runs southeast-northwest through the north-western corner of Lot 9 and across Lot 441 (see Figure 1.2 and Photo 2.2).

2.2.4 Local quarries

A small hard rock quarry (the Pineleigh Quarry) is located 500 m west of the northern section of the project site (see Figure 1.1 and Photo 2.)). A minor, disused quarry (Thomas Pit) is located immediately south of the project site.

2.2.5 Adjacent roads

Two roads are located within 500 m of the project site. These roads are primarily for access to rural properties and are not considered to be sensitive receivers. However, selected viewpoints have been chosen along them to assess the visual impacts to local road users. The two roads are:

- Paytens Bridge Road, which is a paved local road running east-west between the northern and southern sections of the project site
- Pineleigh Road which is an unpaved local road running north-south and located to the west of the project site.

Photo 2.1

Quarry operated by Tastex Pty Ltd adjacent to R1 on their land

Photo 2.2

Current 132kV Forbes-Cowra transmission line running through the project site

Photo 2.3

Wooded, undulating rise to the west of the site

Photo 2.4

Typical undulating rises, vegetation patches and farm infrastructure, southwest of site

Photo 2.5

Onsite vegetation to be retained on rise in the southwestern portion of Lot 441

Photo 2.6

Onsite view from the center of Lot 441 looking south towards Paytens Bridge Road and the southern portion of the project site

2.2.6 Surrounding residences

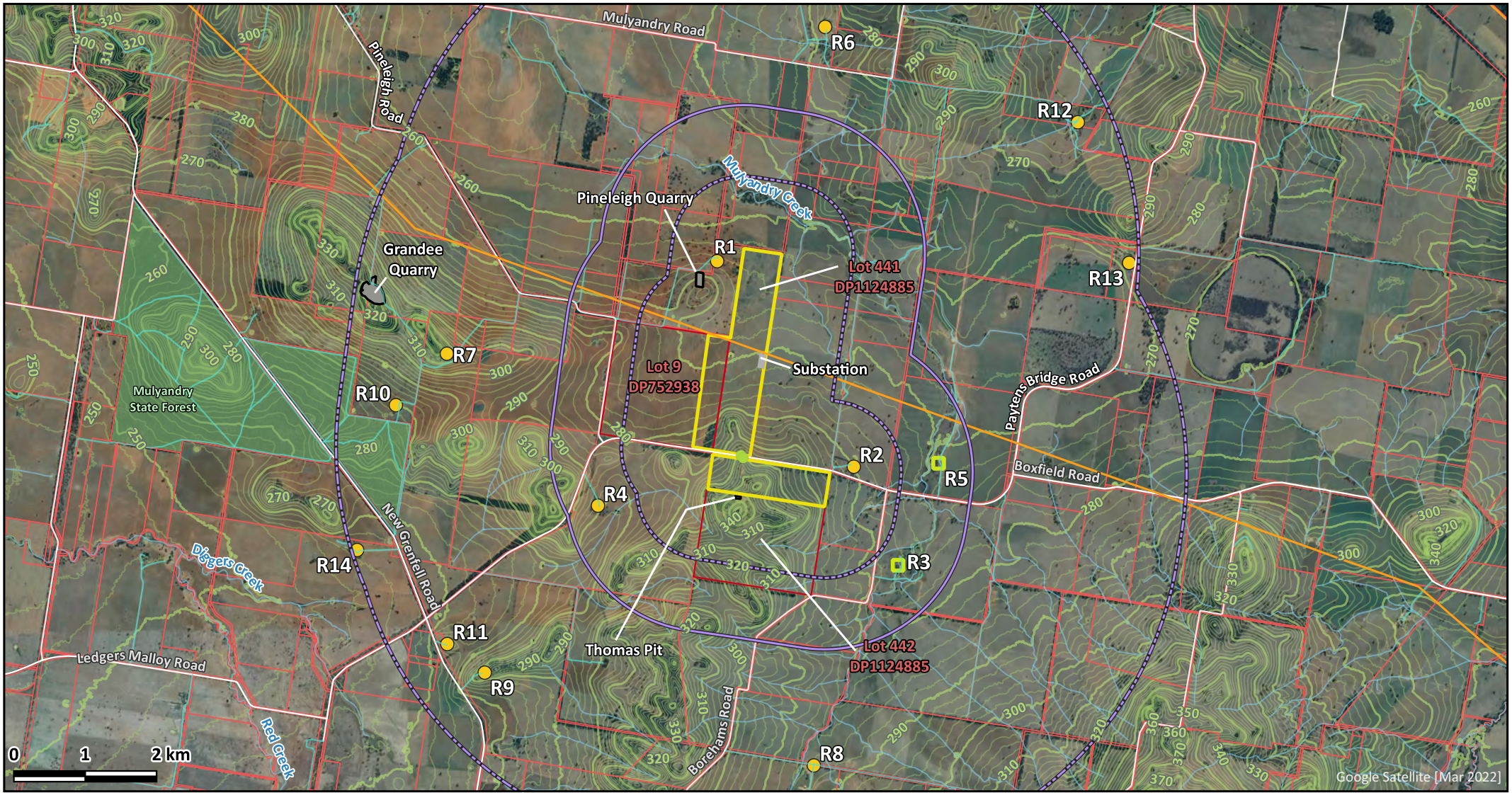
Fourteen scattered residences (R1- R5) are located on rural properties within 2 km of the site. The five residences are located between 320 m and 1.74 km from the project site boundary and between 335 m and 1.76 km from project infrastructure (excluding the perimeter fence), as listed in Table 2.1. An additional nine residences (R6-R14) are located greater than 2 km, but within 5 km of the site. Table 2.1 also shows the elevation of the 14 residences (given in metres above the Australian Height Datum (mAHD)) and the relative elevation difference of the residences to the nearest point of the site boundary. The locations of the residences are shown in Figure 2.1.

Table 2.1 Residences within 5 km of the project site

Residence no.	Description/location	Elevation of residence (mAHD) and relative elevation difference to the site boundary	Distance and direction from nearest site boundary	Distance and direction from nearest site infrastructure
R1	Residence northwest of the main development footprint	• 265 m • +1 m	• 320 m west	• 335 m west
R2	Residence (leased) east of the northern section of the project site (north of Paytens Road), southeast of the substation, and northeast of the southern section of the project site (south of Paytens Bridge Road)	• 281 m • -3 m	• 340 m northeast	• 565 m northeast
R3 (associated residence)	Landowner residence southeast of the development footprint. Residents are related to the involved landholder's family*	• 276 m • -11 m	• 1.42 km southeast	• 1.53 km southeast
R4	Residence southwest of the development footprint	• 286 m • -17 m	• 1.56 km southwest	• 1.59 km southwest
R5 (associated residence)	Unoccupied residence owned by the landowner of Lot 9 DP752938 – east of the development footprint	• 271 m • -13 m	• 1.74 km east	• 1.76 km east

Residence no.	Description/location	Elevation of residence (mAHD) and relative elevation difference to the site boundary	Distance and direction from nearest site boundary	Distance and direction from nearest site infrastructure
R6	Residence north of the development footprint	• 274 m • +12 m	• 3.27 km north	• 3.34 km north
R7	Residence west of the development footprint	• 316 m • +43 m	• 3.60 km west	• 3.62 km west
R8	Residence south of the development footprint	• 287 m • 0 m	• 3.64 km south	• 3.68 km south
R9	Residence southwest of the development footprint	• 284 m • -19 m	• 4.04 km southwest	• 4.12 km southwest
R10	Residence west of the development footprint	• 280 m • -2 m	• 4.19 km west	• 4.21 km west
R11	Residence southwest of the development footprint	• 270 m • -33 m	• 4.24 km southwest	• 4.30 km southwest
R12	Residence northeast of the development footprint	• 264 m • +1 m	• 4.57 km northeast	• 4.61 km northeast
R13	Residence northeast of the development footprint	• 273 m • +10 m	• 4.90 km northeast	• 4.92 km northeast
R14	Residence southwest of the development footprint	• 257 m • -27 m	• 4.92 km southwest	• 4.96 km southwest

*Residents are supportive of the project. Therefore all engagements have been via the involved landholder



- Project site
- Lot boundary
- Substation
- Exclusion zone
- Residence - associated
- Residence - non-associated
- Project site access point
- Lot boundary
- State Forest
- 1 km radius from project site
- 2 km radius from project site
- 5 km radius from project site
- Main watercourse
- Watercourse - tributary
- Existing transmission line
- Contour AHD (10 m interval)
- Contour AHD (2 m interval)

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Figure 2.1. Sensitive receivers and topography

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Additional data: NSW RoadSegment, NSW Hydroline, NSW_Six_Forbes_Cadastral_data

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2.2.7 Existing vegetation

Due to the long history of grazing and cropping activities native vegetation is largely absent from the project site. Remnant vegetation patches within the project site are generally associated with the presence of the undulating rises and have been excluded from the disturbance footprint (see Figure 2.1).

The wider landscape also consists largely of land historically cleared for agriculture, with vegetation (other than grassland) predominantly found on undulating hills, surrounding dwellings, and along road reserves, drainage lines and fencelines.

Pre-clearing vegetation communities within the project site were identified during the biodiversity survey (OzArk 2022) and are listed in Table 2.2, along with their current condition.

Table 2.2 Plant community types occurring within the project site

Name	Plant community type (PCT)	Condition	Area (ha)
267_Good	267-White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Good	6.13
267_Mod	267-White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Moderate	5.47
267_Poor	267-White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	Poor	48.41
282_Good	282-Blakely's Red Gum - White Box - Yellow Box - Black Cypress Pine grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion	Good	4.65
282_Mod	282-Blakely's Red Gum - White Box - Yellow Box - Black Cypress Pine grass/shrub woodland on clay loam soils on undulating hills of central NSW South Western Slopes Bioregion	Moderate	32.58
676_Mod	676-Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Moderate	0.15

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.

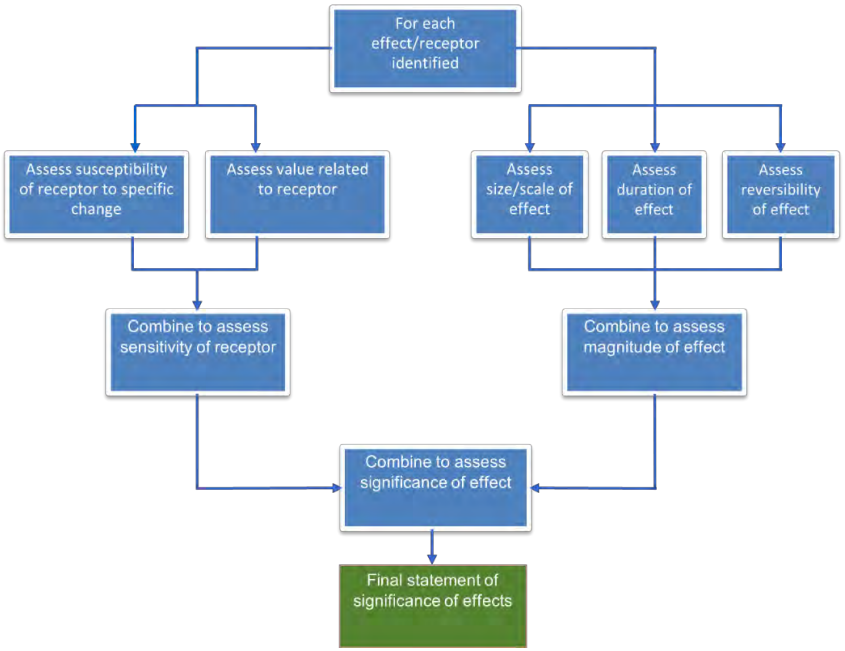

Figure 3.1 Flowchart for assessing visual impact of a proposal (LIIEMA 2013)

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 [these people 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 Peninsula SF, visual receptors fall into two main categories:

- people living at residences near the project site (e.g. those listed in Table 2.1) and moving around their properties
- road users (generally local people) using Paytens Bridge Road and Pineleigh 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 residence 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 largely 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. The definition for negligible adopted the draft NSW guideline definition for very low viewer sensitivity (DPIE 2021).

Table 3.1 Sensitivity definitions

Sensitivity	Definition
High	Private residents at home with prolonged viewing opportunities, heritage properties and landscapes.
Moderate	Commercial properties, travelers 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	Low use and low concern viewpoints and travel routes.

The higher the visual quality of the landscape, the greater the significance of introducing a 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 (including 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.

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

Magnitude	Definition
	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 Visual receivers and viewpoint selection

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

3.2.1 Preliminary visual assessment

Based on the method proposed for preliminary visual assessment set out in Appendix B of the *Draft Large-Scale Solar Energy Guideline* (DPIE 2021), the 12 non-associated residences located within 5 km of the project site were screened based on their distance from the site and elevation in respect of the site. As R3 and R5 are owned by the associated landholders who are part of the commercial venture of the solar project, they have not been included in the assessment.

The 12 non-associated residences were plotted on the DPIE (2021) Preliminary Assessment Tool, based on their distance from the project site boundary and considerations of relative height, as shown in Figure 3.3. Calculations are shown in Attachment 1.

Three of the residences (R1, R2 and R4) plotted under the line and were therefore identified as visual receivers requiring detailed visual assessment.

The project site is visible from the two nearest roads (Paytens Bridge Road and Pineleigh Road). These roads are therefore also classified as visual receivers, requiring a detailed visual assessment. Roads in the vicinity of the project site are used for functional purposes (e.g. movement to a major highway, or access to farmland via local roads).

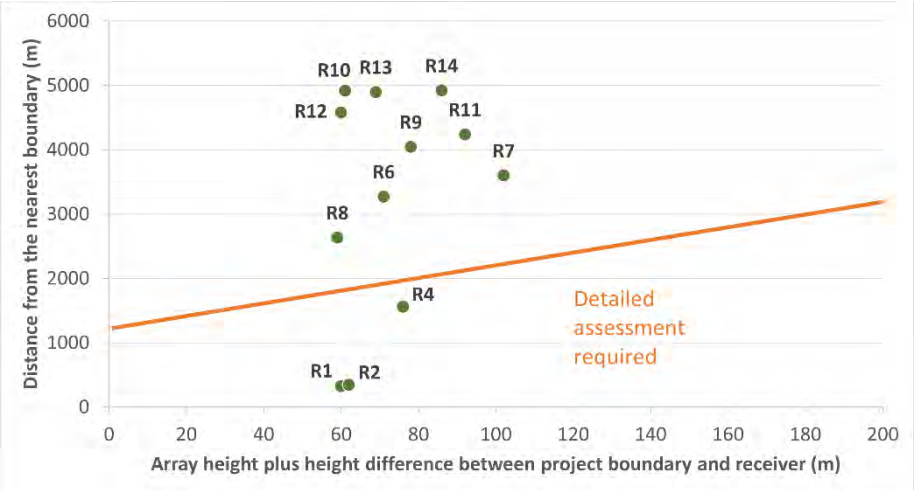

Figure 3.3 Preliminary visual assessment

3.2.2 Detailed visual assessment

Three methods were used to assess the visual impacts of the project on the potential sensitive receivers:

- a viewshed analysis was undertaken to assess the topographical relationship between the project site and the receivers (Figure 3.4)
- cross-sections were prepared to provide a visual representation of topography between selected residences and the closest point to the proposed solar panel boundary

- viewpoint analysis was undertaken from the sensitive receivers towards the site.

The viewshed analysis was undertaken to illustrate the potential visibility of the project site and proposed facilities from the three residences. By considering lines of sight from the surrounding topography, the analysis shows the 'visual catchment' of the project.

Figure 3.4 shows the area surrounding the project site within which at least part of the project is visible (ignoring the potential screening effects of intervening vegetation or structures). Two images are shown on the figure:

- the first image shows the visual catchment of the solar arrays (assumed to be 4 m above the ground)
- the second image shows the visual catchment of the substation which is assumed to be 10 m in height (the analysis excludes the less visually intrusive lightning rods that extend to 12 m).

Based on the viewshed analysis, the solar arrays and the substation were confirmed as being potentially visible from residences R1, R2 and R4 (i.e. the view of the site is not fully obscured by topography). The viewshed analysis also identifies residences R6, R7, R9, R11 and R13 as potential visual receivers, although based on the outcomes of the preliminary screening (see Figure 3.3), they are not considered sensitive receivers.

Residences R1, R2 and R4 are discussed further below in regard to their sensitivity as visual receivers.

RESIDENCE R1

R1 is the closest residence to project site, located 320 m west of the northern section of the site. The residence is located within a compound which has a fence along most of its eastern border and trees and a wall along its southern border (Photo 3.1). Located close to the residential compound between the compound and the project site are a number of farm sheds (e.g. to the east and southeast) and numerous scattered trees.

Photo 3.1 Residence R1, viewed from southeast

AE1173.1 Peninsula SF
Figure 3.4. Viewshed analysis
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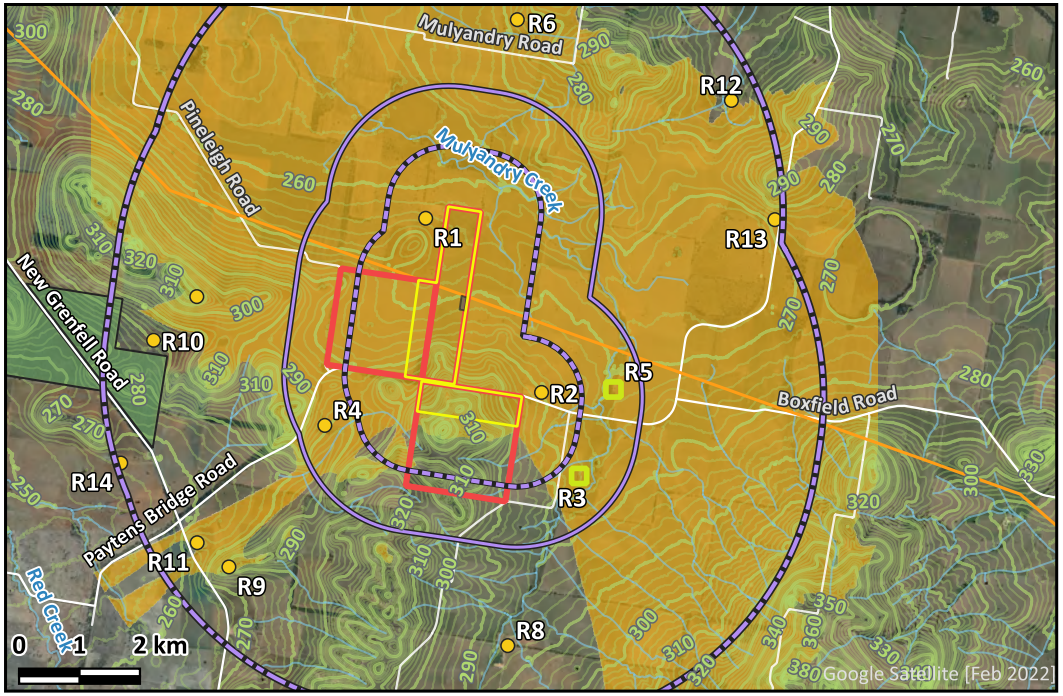
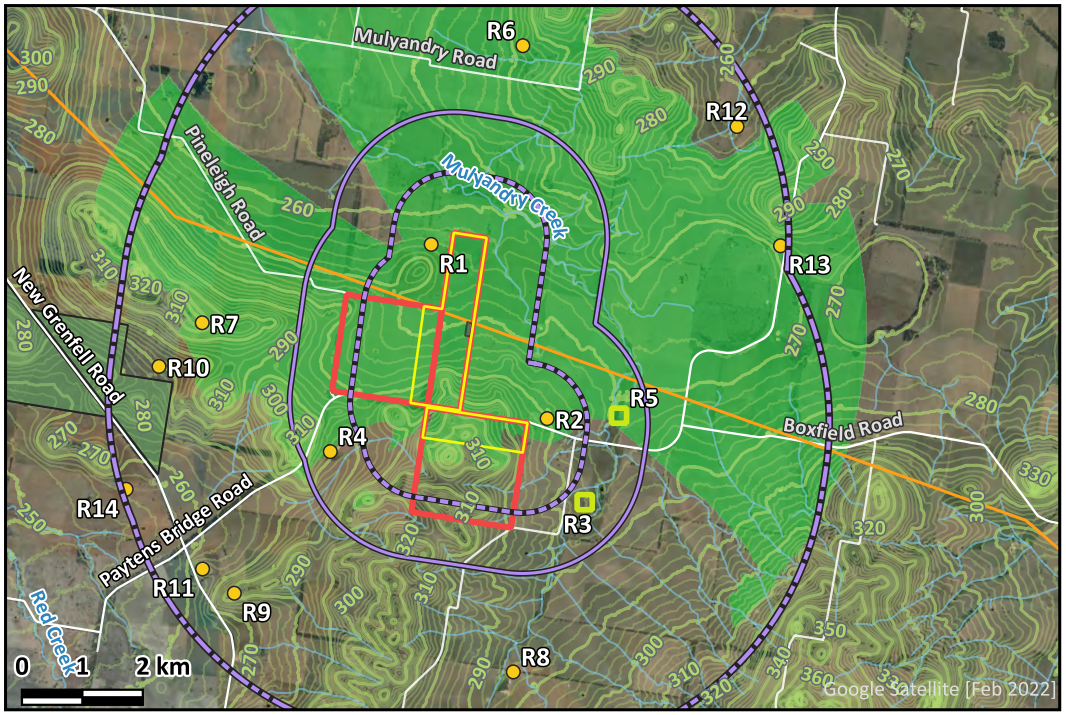
CRS: GDA 1994 MGA Zone 55
Scale: 1:125,000 @ A4
Page size: A4



Viewshed analysis, solar panel height 4 m



Viewshed analysis, substation height 10 m

N

- Project site
- Lot boundary (project site)
- Substation
- Residence, non-associated
- Residence, associated
- 1 km radius from site
- 2 km radius from site
- 5 km radius from site

Area project site infrastructure is potentially visible based on structures of the following heights:

- Solar panels, 4 m tall
- Substation, 10 m tall

- Existing transmission line
- Watercourse - tributary
- Contour AHD (10 m interval)

Additional data: NSW RoadSegment, NSW Hydroline, NSW ElectricityTransmissionLine, NSW Six Contours_2m_AHD.

Note these viewshed analysis outcomes were created using a contour digital elevation model (DEM) (terrain only)

The potential visibility of the project site from within the compound is therefore limited to the northernmost end of the site when looking to the northeast, and some potential to glimpse the site through the break in the fence in the southeastern corner of the compound, when looking southeast.

RESIDENCE R2

R2 is the second closest residence to the project site, being located 340 m northeast of the southern section of the project site. As shown in the cross section below (Figure 3.5), the residence is located at a lower elevation than the project site (approximately 6 m or more height difference) and there are a number of low rises between the residence and the project site which may partially obscure the solar arrays, depending on the direction of view. In addition, there are trees located around the housing compound, which along with scattered paddock trees located between the compound and the site, would help shield the southern section of the project from view.

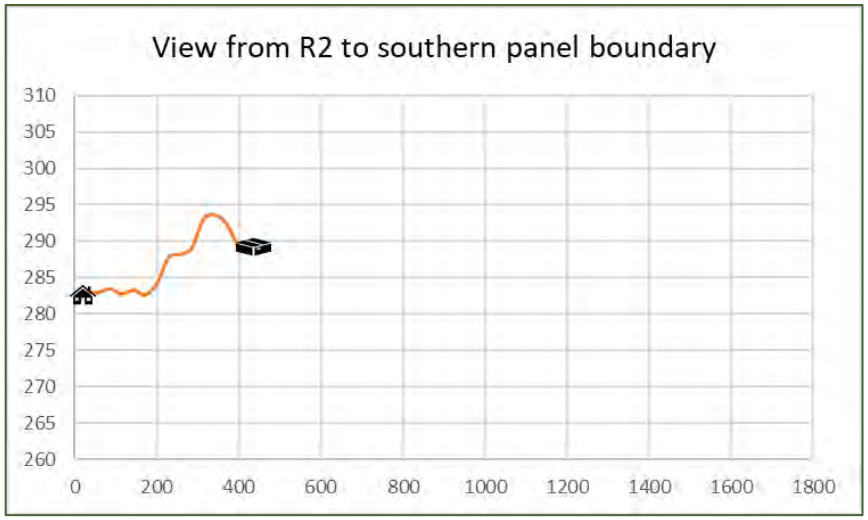


Figure 3.5 Cross section from R2 to southern section boundary

The cross section below (Figure 3.6) shows the typical topography between R2 and the northern section of the project site. R2 is located at a lower elevation than the northern site along the line of the cross section but is higher than some areas of the northern site. The northern section is expected to be obscured from view by the intervening topography. In addition, various treelines, numerous paddock trees and the trees around the housing compound would provide a high level of screening of the northern section. The northern section of the site is also located much further from R2 (1.4 km) than the southern site (340 m).

While the visual catchment of the solar arrays in Figure 3.4 includes R2, this is due to its proximity to the southern section rather than visual exposure to from the northern section. Based on the visual catchment of the substation shown in Figure 3.4, it is possible that the top of the

substation will be visible from R2. However, any view of the substation is expected to be largely obscured by intervening vegetation and, as the substation will be more than 1.8 km from R2, visual impacts are expected to be minimal.

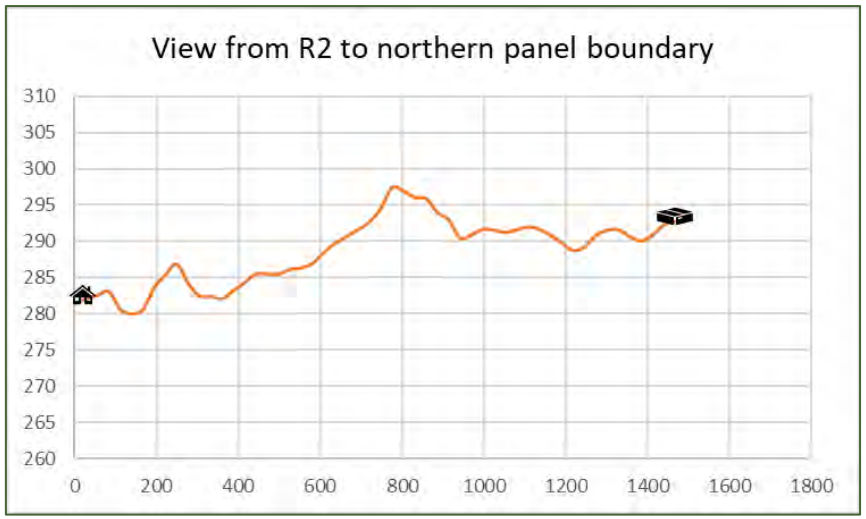


Figure 3.6 Cross section from R2 to northern section boundary

RESIDENCE R4

R4 is located at about 1.6 km from both the northern and southern sections of the project site. The cross sections below (Figures 3.7 and 3.8) indicate that the solar arrays in the southern section of the site will be visible from the residence, while the northern panels are likely to be largely obscured by topography. The cross sections also show that R4 is lower than the nearest panels on the southern section of the site, but at a comparable or marginally higher level than the northern section of the site.

Numerous trees are planted around the R4 housing compound, including between the house and the project site and would reduce the visual impacts of the project. A dense treeline along Paytens Bridge Road would be expected to almost totally exclude visibility of the northern section. The wooded undulating rises immediately south of the southern section of the site also provide some topographic and vegetation screening.

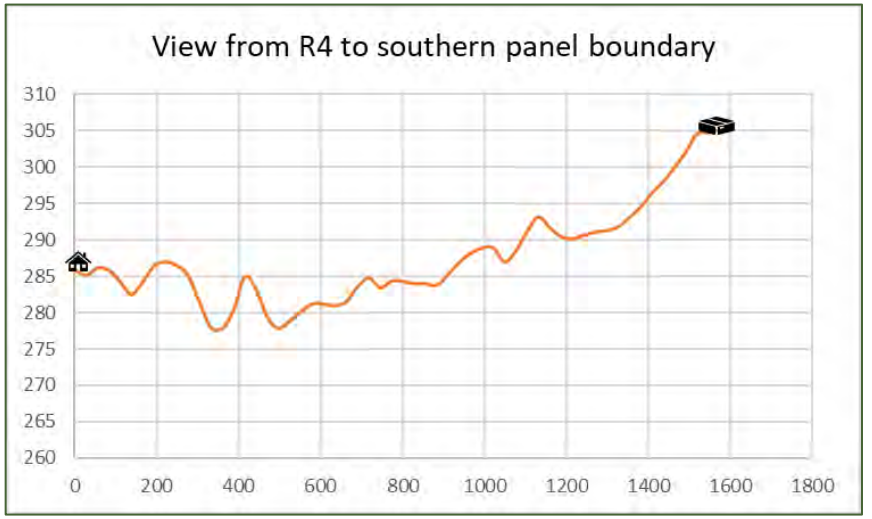


Figure 3.7 Cross section from R4 to southern section boundary

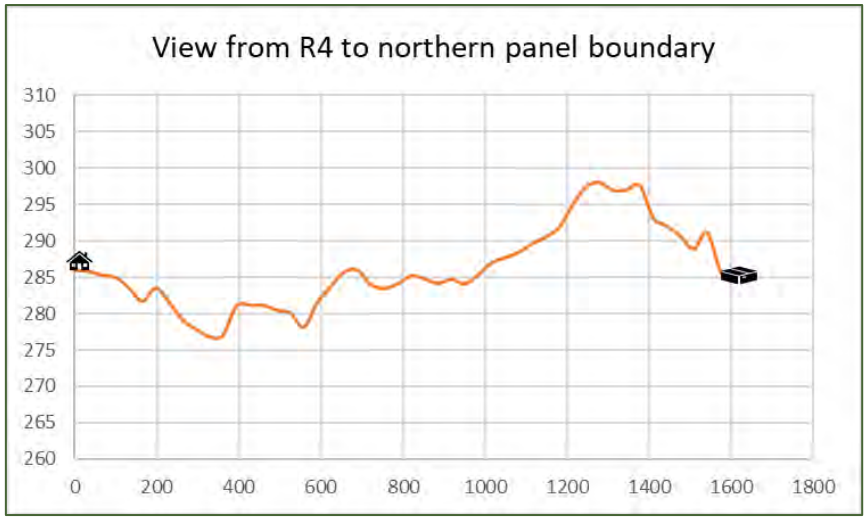


Figure 3.8 Cross section from R4 to northern section boundary

3.2.3 Viewpoints

Viewpoints (VPs) are positions looking towards the proposal that consider views from receivers.

Accent has selected six viewpoints for analysis as described in Table 3.3 and shown in Figure 3.9.

Table 3.3 Selected viewpoints for analysis

Viewpoint	Description	Distance and direction from site
VP1	**Purpose**: view from surrounds of R1 residential compound ('Pineleigh') towards northern section **Location**: approximately 150 m southeast of R1 compound **Direction of view**: southeast **Subject of view**: solar arrays in northern section of project site	Approximately 800 m northwest of northern section solar arrays along central line of sight
VP2a	**Purpose**: view from surrounds of R2 residential compound towards southern section and view from Paytens Bridge Road **Location**: at southern end of R2 driveway, next to Paytens Bridge Road **Direction of view**: southwest **Subject of view**: solar arrays in southern section of project site	Approximately 500 m northeast of southern section solar arrays along central line of sight
VP2b	**Purpose**: view from surrounds of R2 residential compound towards northern section **Location**: approximately 30 m northwest of R2 residential compound **Direction of view**: northwest **Subject of view**: towards solar arrays and substation in northern section of project site	Approximately 1.9 km southeast of substation along central line of sight

Viewpoint	Description	Distance and direction from site
VP2c	**Purpose**: represents typical view from adjacent paddock (R2 landholder) **Location**: paddock approximately 1.2 km northwest of R2 residential compound **Direction of view**: west-southwest **Subject of view**: solar arrays, substation and BESS (if centralised) in northern section of project site	Approximately 650 m east-northeast of solar arrays along central line of sight
VP3	**Purpose**: view from Pineleigh Road **Location**: Pineleigh Road approximately 850 m north of Paytens Bridge Road **Direction of view**: east-southeast **Subject of view**: solar arrays in northern section of project site	Approximately 1.3 km west-northwest of northern section solar arrays along central line of sight
VP4	**Purpose**: representative of view from surrounds of R4 residential compound, and provides view from Paytens Bridge Road **Location**: Paytens Bridge Road, approximately 750 m north of R4 housing compound **Direction of view**: east-southeast **Subject of view**: solar arrays in southern section of project site (also partly looking towards northern section)	Approximately 1.6 km west-northwest of southern section solar arrays along central line of sight

In combination, the six viewpoints provide representative views from the surrounds of each of the sensitive receiver residential compounds (R1, R2 and R4) as well as along Paytens Bridge Road (two locations) and Pineleigh Road (one location). The viewpoints also include a typical view (VP2c) from an adjacent paddock for illustrative purposes.

3.3 Viewpoint impact assessment

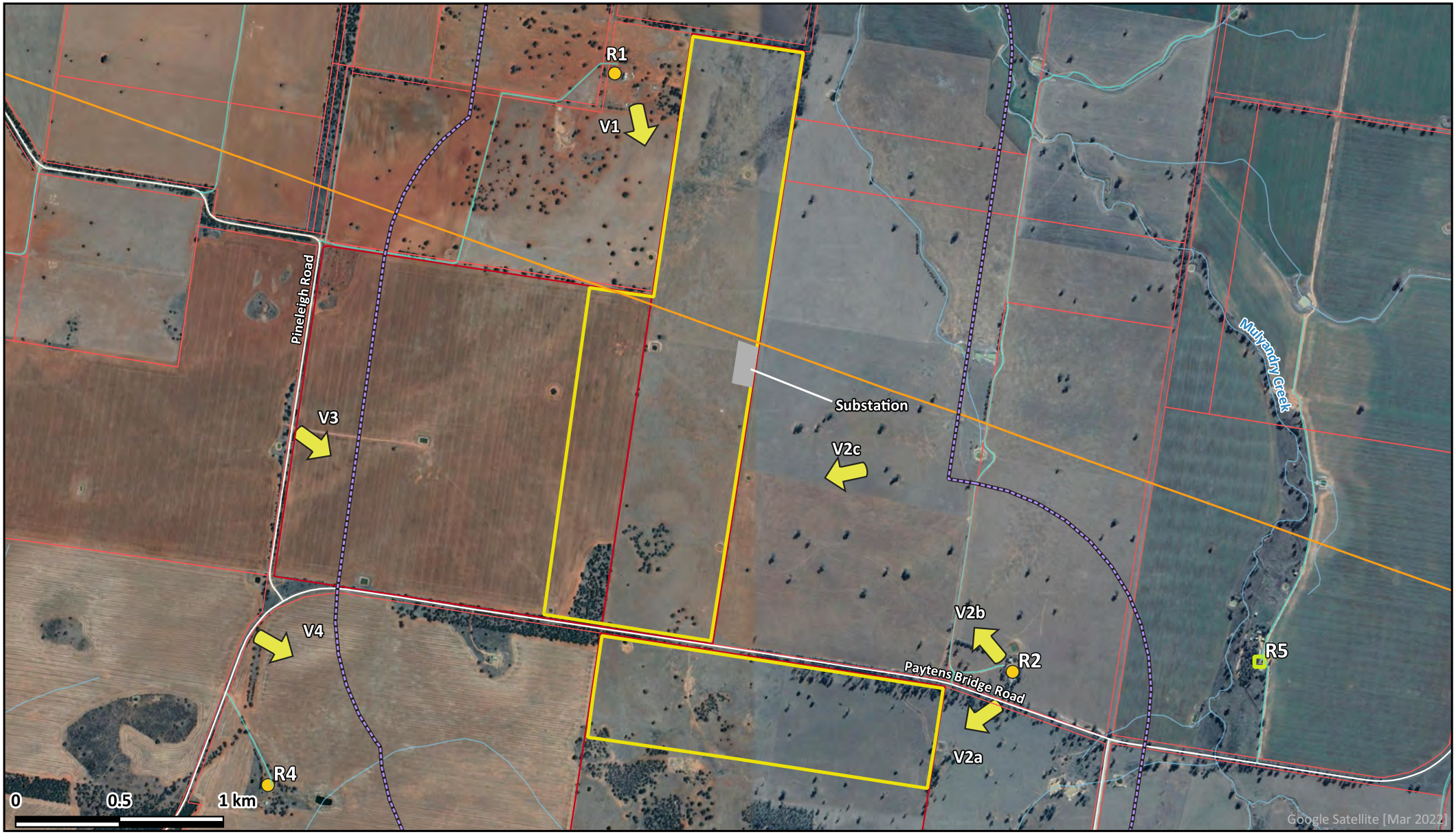
Whether visual receivers are also sensitive receivers depends on their susceptibility to change in views and visual amenity, as well as the value attached to particular views.

LIIEMA (2013) considers that visual receptors most susceptible to change include residents at home. The occupants of residences R1, R2 and R4 are therefore considered to be the sensitive receivers. The users of Paytens Bridge Road and Pineleigh are also considered sensitive receivers although, based on the LIIEMA guidance, they are less susceptible to visual change than people living at residences.

The potential for visual impacts at each of the viewpoints in Table 3.3 during operations is assessed below by considering the:

- nature of potential impacts
- sensitivity of the landscape character at the viewpoint
- magnitude of the project impact as seen from the viewpoint
- impact rating (using the matrix in Figure 3.2).

Photomontages (Figures 3.9 to 3.20) have been prepared to simulate the visual impacts of the proposed development from the viewpoint locations shown in Figure 3.9 and the viewpoint impacts analyses are described in the tables (Table 3.4 to 3.9) below the respective photomontages. The photomontages assume that the solar panels and other components will be comparable to the type shown in Figures 1.3 and 1.4.



Project site
Lot boundary (project site)
Associated residence
Non-associated residence
Viewpoint and direction of view
Substation
Lot boundary
Existing transmission line
Watercourse - tributary
1 km radius from project site

N

AE1173.1 Peninsula SF
Figure 3.9. Viewpoints and direction of view
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CRS: GDA 1994 MGA Zone 55
Page size: A4
Additional data: NSW RoadSegment, NSW Hydroline, NSW ElectricityTransmissionLine, NSW Six cadastral data

ACCENT ENVIRONMENTAL

3.3.1 Viewpoint 1 (VP1) – 150 m southeast from Residence R1

Figure 3.10 Viewpoint 1: Current view of proposed Peninsula SF site looking southeast from 'Pineleigh'

Figure 3.11 Viewpoint 1: Simulated view of proposed Peninsula SF site looking southeast from 'Pineleigh'

Table 3.4 Viewpoint 1: visual impact analysis

Impacts – VP1	Sensitivity	Magnitude	Impact rating (pre-mitigation)
Northern section: the solar arrays and associated infrastructure are projected to be readily visible. **Southern section:** does not intersect with this viewpoint direction.	• Open and visible landscape character. • Rural landscape – farmland with scattered trees, treelines, and existing farm infrastructure. • Existing transmission line visible. • Sensitivity is **Low** as the viewpoint is outside the residential compound in a place of work.	• The northern section solar arrays are clearly visible beyond the eastern boundary fence of the R1 property. However, the arrays are not expected to intrude above the landscape line on the horizon. The trees and farm infrastructure in the foreground break up the view of the arrays and are more dominant visual elements. • The southern section solar arrays are distant (more than 2.5 km) from the viewpoint and are obscured by topography and vegetation/scattered trees. • As the BESS units are of lesser height (3 m) than either the solar arrays (4 m) or substation (10 m plus lightning rods), the visual impacts are assumed to be driven primarily by the arrays and substation. • The pre-mitigation magnitude is assessed as **Moderate**.	• The pre-mitigation impact rating is assessed as **Moderate-low**. • No mitigation is proposed as this is not considered a sensitive viewpoint.

3.3.2 Viewpoint 2a (VP2a): Southwest view from Paytens Bridge Road at the driveway to Residence R2

Figure 3.12 Viewpoint 2a: Current view of proposed Peninsula SF project site looking southwest from Paytens Bridge Road

Figure 3.13 Viewpoint 2a: Simulated view of proposed Peninsula SF project site looking southwest from Paytens Bridge Road

Table 3.5 Viewpoint 2a: visual impact analysis

Impacts (VP2a)	Sensitivity	Magnitude	Impact rating (pre-mitigation)
Northern section: does not intersect with this viewpoint direction. **Southern section:** the solar arrays and associated infrastructure are readily visible from this viewpoint.	• Open and visible landscape character. • Rural landscape – farmland with scattered trees, treelines, and existing farm infrastructure. • Wooded, undulating rises behind solar arrays. • Sensitivity is **Low** as the viewpoint is a transient space for road users and a place of work for local landholders.	• Northern section not visible from this viewpoint. • The southern section solar arrays are located about only 500 m from the viewpoint and the site security fence is about 300 m away. Both components will be clearly visible. • The arrays are not expected to intrude above the wooded undulated rises behind them. The foreground trees along the roadside corridor and the intervening paddock trees break up and partially obscure the view of the arrays and are more dominant visual elements. • The BESS units are of lesser height (3 m) than the solar arrays (4 m) and are expected to be largely obscured by the panels (if decentralised BESS option chosen) or confined to northern section (if centralised BESS option chosen). • The pre-mitigation magnitude is assessed as **Moderate**.	• The pre-mitigation impact rating is assessed as **Moderate-low**. • No mitigation is proposed as this is not considered a sensitive viewpoint.

3.3.3 Viewpoint 2b: Northwest view from adjacent to residence R2 residential compound

Figure 3.14 Viewpoint 2b: Current view of proposed Peninsula SF project site looking northwest from adjacent to R2 compound

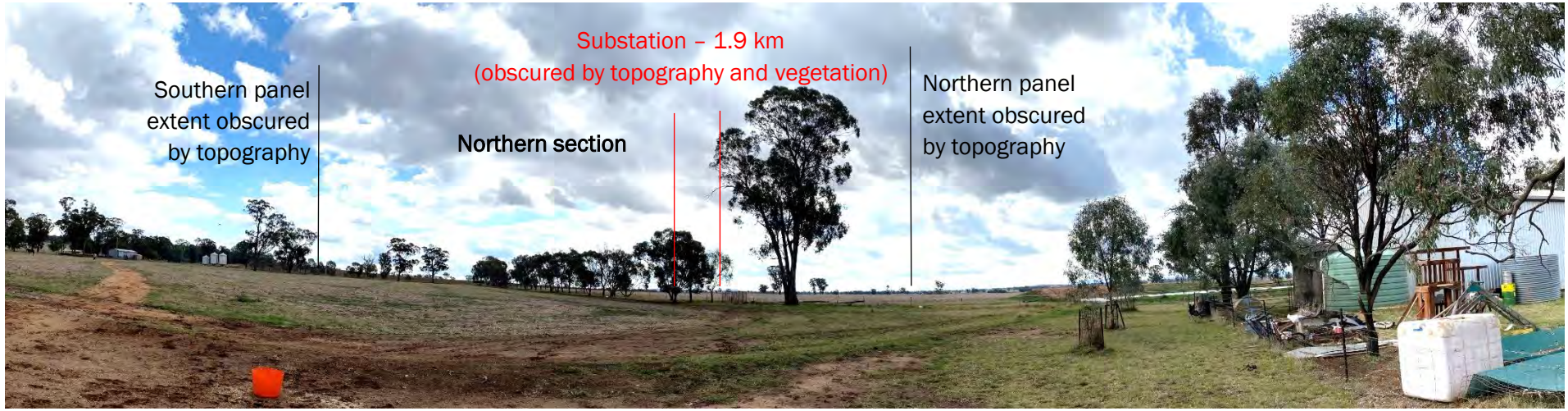

Figure 3.15 Viewpoint 2b: Simulated view of proposed Peninsula SF project site looking northwest from adjacent to R2 compound

Table 3.6 Viewpoint 2b: visual impact analysis

Impacts – V2b	Sensitivity	Magnitude	Impact rating (pre-mitigation)
Northern section: the solar arrays and associated infrastructure are projected to be obscured by vegetation and topography, except possible the top of the substation. **Southern section:** does not intersect with this viewpoint direction.	• Open and visible landscape character. • Rural landscape – farmland with scattered trees, treelines, and existing farm infrastructure. • Gently undulating terrain close to viewpoint. • Sensitivity is **Low** as the viewpoint is outside the residential compound in a place of work.	• The relative elevation of the property and the gentle rise to the west and northwest of the viewpoint provides natural screening of the northern section of the solar farm. • Treelines and paddock trees provide additional screening effects. • The top of the substation may be just visible above the topography, but will be partially screened by trees and due to its distance (1.9 km), visual impacts are expected to be negligible. • The pre-mitigation magnitude is assessed as **Negligible**.	• The pre-mitigation impact rating is assessed as **Negligible**. • No mitigation is proposed as this is not considered a sensitive viewpoint.

3.3.4 Viewpoint 2c: West-southwest view from adjacent paddock east of project site

Figure 3.16 Viewpoint 2c: Current view of proposed Peninsula SF project site looking west

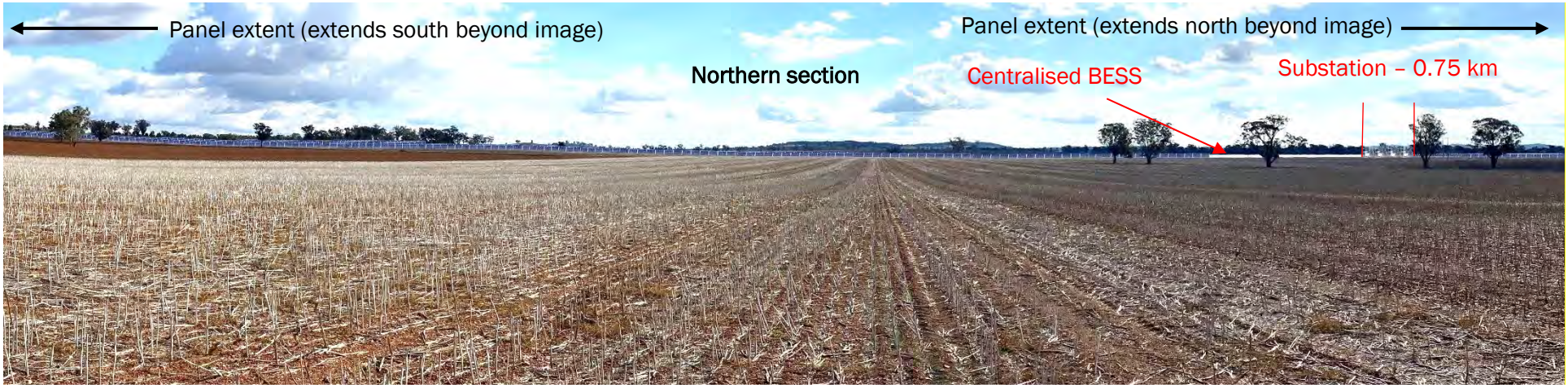

Figure 3.17 Viewpoint 2c: Simulated view of proposed Peninsula SF project site looking west

Table 3.7 Viewpoint 2c: visual impact analysis

Impacts (V2c)	Sensitivity	Magnitude	Impact rating (pre-mitigation)
Northern section: the solar arrays and associated infrastructure are readily visible from this viewpoint. **Southern section: does not intersect with this** viewpoint direction.	• Open and visible landscape character. • Rural landscape – farmland with scattered trees and treelines. • Existing transmission line visible. • Wooded, undulating rises visible behind solar arrays. • Hilly terrain on horizon. • Sensitivity is **Low** as the viewpoint is a place of work for local landholders.	• The northern section solar arrays are located about 650 m from the viewpoint and extend across the field of vision. • The substation is clearly visible from this viewpoint. • The BESS units, if the centralised BESS option is chosen, are clearly visible nest to the substation. • There are only a small number of paddock trees breaking the view to the solar farm facilities. • The solar farm facilities are not expected to intrude above the wooded undulated rises behind them or the line of the horizon. • The pre-mitigation magnitude is assessed as **High**.	• The pre-mitigation impact rating is assessed as **Moderate**. • No mitigation is proposed as this is not considered a sensitive viewpoint.

3.3.5 Viewpoint 3: East-southeast view from Pineleigh Road

Figure 3.18 Viewpoint 3: Current view of proposed Peninsula SF project site looking east-southeast from Pineleigh Road

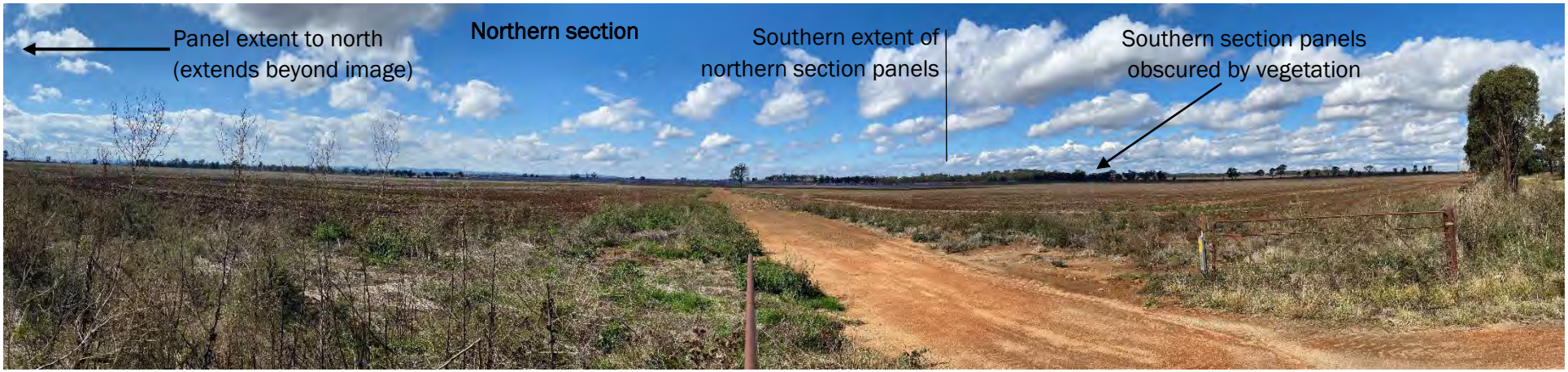

Figure 3.19 Viewpoint 3: Simulated view of proposed Peninsula SF project site looking east-southeast from Pineleigh Road

Table 3.8 Viewpoint 3: visual impact analysis

Impacts (V3)	Sensitivity	Magnitude	Impact rating (pre-mitigation)
Northern section: the solar arrays and associated infrastructure are readily visible from this viewpoint. **Southern section:** the solar arrays and associated infrastructure are obscured by vegetation.	• Open and visible landscape character. • Rural landscape – farmland with scattered trees, treelines, and existing farm infrastructure. • Existing transmission line visible. • Wooded, undulating rises visible behind solar arrays. • Hilly terrain on horizon. • Sensitivity is **Low** as the viewpoint is a transient space for road users and a place of work for local landholders.	• The northern section solar arrays are located about 850 m from the viewpoint and extend across approximately two-thirds the field of vision. However, due to the distance and the vegetation behind them, they are not visually intrusive. • The BESS units, if the centralised BESS option is chosen, would be visible but also not visually intrusive due to distance. • There are only a small number of paddock trees breaking the view to the solar farm facilities. • The solar farm facilities are not expected to intrude above the line of the horizon. • In the southern section, the solar arrays and associated infrastructure are obscured by vegetation. • The pre-mitigation magnitude is assessed as **Moderate** for the northern section and **Negligible** for the southern section.	• The pre-mitigation impact rating is assessed as **Moderate-low** based on the visual impacts of the northern section. • No mitigation is proposed as this is not considered a sensitive viewpoint.

3.3.6 Viewpoint 4: Northeast view from Paytens Bridge Road

Figure 3.20 Viewpoint 4: Current view of proposed Peninsula SF project site looking southeast from Paytens Bridge Road

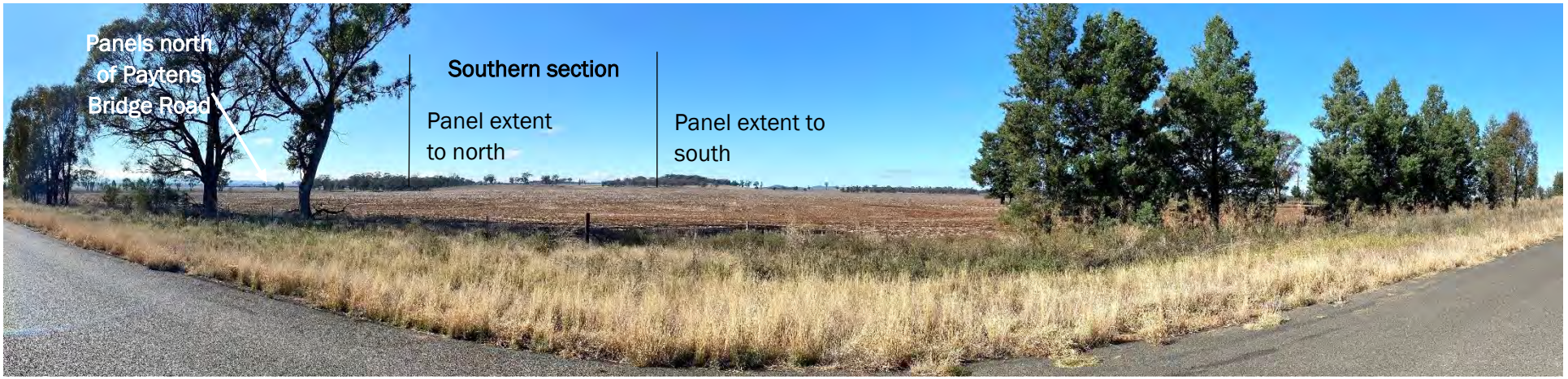

Figure 3.21 Viewpoint 4: Simulated view of proposed Peninsula SF project site looking southeast from Paytens Bridge Road

Table 3.9 Viewpoint 4: visual impact analysis

Impacts	Sensitivity	Magnitude	Impact rating (pre-mitigation)
Northern section: the solar arrays and associated infrastructure **are** almost entirely obscured by vegetation and topography. **Southern section:** the solar arrays and associated infrastructure are readily visible from this viewpoint.	• Open and visible landscape character. • Rural landscape – farmland with scattered trees, treelines and existing farm infrastructure. • Wooded, undulating rises are present. • Sensitivity is **Low** for all portions of the development footprint.	• For the northern section, the solar arrays are almost entirely obscured by vegetation and topography, in particular, a dense line of trees along Paytens Bridge Road. Some panels may be just visible, but as they will be located about 1.3 km away, visual impacts are expected to be negligible. • For the southern section the solar arrays will be located approximately 1.6 km from the viewpoint. The roadside vegetation in the foreground and the wooded undulating rises located in front, between and behind different sections of the solar arrays are more dominant visual elements. • For the northern section, the magnitude of visual impact is projected to be **Negligible**. • For the southern section, the magnitude of visual impact is projected to be **Negligible**.	• The impact rating is assessed as **Negligible**. • No mitigation is proposed as this is not considered a sensitive viewpoint.

The following considerations are common to all the assessed receivers:

- The duration of construction-related visual impacts will be temporary in nature, lasting for a relatively short 10-18 months (approximately). Operational impacts, however, will last for 30 years.
- Night-lighting impacts during both construction and operation are expected to be readily manageable and minor as construction is limited to daylight hours (see Section 5.5).
- Visual impacts associated with traffic will be much greater during construction.

It is anticipated that decommissioning activities would be similar in nature and duration to those during the construction phase. At the completion of rehabilitation, the project site would have been returned to its existing rural landscape character.

3.4 Visual impact assessment summary

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

- the potential sensitive receivers in the vicinity of the site
- the type of sensitive receiver
- distance and elevation of sensitive receiver in relation to site
- visibility of site from sensitive receiver
- profile of proposed infrastructure
- the type of materials proposed to be used in construction
- the nature, location and frequency of project-related traffic accessing the site
- lighting required during construction and operation.

In summary, three residences (R1, R2 and R4) and two roads (Paytens Bridge Road and Pineleigh Road) were identified as viewpoints requiring detailed assessment.

A summary of the pre-mitigation visual impact assessment for the six viewpoints is provided in Table 3.10.

Table 3.10 Viewpoint visual impact assessment summary

Viewpoint/ residence	Sensitivity	Magnitude	Impact rating (pre-mitigation)
VP1	Low	Moderate	Moderate-Low
VP2a	Low	Moderate	Moderate-Low
VP2b	Low	Negligible	Negligible
VP2c	Low	High	Moderate
VP3	Low	Moderate	Moderate-Low
VP4	Low	Negligible	Negligible

3.4.1 Specific requirements for impact mitigation

As the six viewpoints were located on rural land or local roads, the sensitivity of the impacts was identified as low. The viewpoint with the highest pre-mitigation visual impact rating was VP2c which had a moderate impact rating. Viewpoints VP1, VP2a and VP3 had moderate-low impact ratings. No specific mitigation measures such as visual screening zones are considered to be required for the six viewpoints.

From the R1, R2 and R4 residential compounds, the sensitivity to visual impact will be high, but the magnitude of impact will be reduced due to the trees and fences located around the houses, as outlined in Section 3.2.2.

Only the far northern end of the project site is likely to be visible from within the R1 compound. This impact has been mitigated by excluding this northern area of the site from development. The excluded area is shown on Figure 1.2 as non-development zone number 1.

No specific mitigation measures such as visual screening zones are considered to be required for residences R2 and R4.

Although no specific mitigation measures are proposed based on the viewpoint analysis, other than the exclusion of the far northern section of the site from development, a range of general visual mitigation measures are outlined in Section 4.

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 positioned to minimise the potential increase in light pollution for adjacent receptors.

The likely visual impacts of project night lighting on surrounding residences, air traffic and road corridors 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 residence R1, R2 and R4. Given the relatively minor amount of construction and operational lighting required for the project and the proposed management measures outlined above, night lighting is unlikely to pose a significantly adverse impact to any residences.

3.5.2 Air traffic

The closest airport to the solar farm site is Forbes Airport 35 km northwest. An additional five registered aerodromes are located within 100 km of the site: Parkes (50 km north), Cowra Airport (50 km southeast), Young Airport (74 km south), Orange Airport (88 km northeast) and West Wyalong (100 km southwest).

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.

3.5.3 Road corridors

Light spill from the development is unlikely to impact surrounding roads users, including Paytens Bridge Road, Pineleigh Road or other local roads, given the proposed light management measures and relatively minor amount of construction and operational lighting required for the project.

3.5.4 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 receivers. Receivers within a closer proximity to the proposal will be exposed to more direct glare effects.

SOLAR PANEL DESIGN

The solar panels are designed to track the sun, east-west, along a single axis to maximise energy absorption. The solar panels would remain at a stationary and constant 52-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 -52-degree angle.

Considering that the solar panels will remain at a static 52-degree angle in the early hours of morning and late afternoon, the resulting specular glare is likely to have a negligible influence on sensitive receivers, and any glare would reflect away from ground-based receivers.

Photovoltaic solar panels are specifically designed to maximise the absorption of solar energy for the purpose of converting it to electricity. Good quality panels incorporate reflective glass front surfaces to capture and retain as much as possible of the solar spectrum. Typical panels are designed to reflect only about 2% of incoming sunlight and the glass of a solar panel has less reflectivity than window glass (MDER et al 2015).

The 2010 USA Federal Aviation Administration (FAA) document *Technical Guidance for Evaluating Selected Solar Technologies on Airports* includes a diagram which illustrates the relative reflectance of solar panels compared to other surfaces, as summarised in Table 3.11 (FAA 2010).

The potential for glare associated with non-concentrating photovoltaic systems which do not involve mirrors or lenses is therefore relatively limited. They generally do not create nuisance glare compared with other commonly existing surfaces such as roofs and are less reflective than other naturally occurring elements (see Table 3.11).

Within the pastoral, rural context of the project site, 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 potentially cause glare or reflections depending on the sun's angle, including the following (note

that this infrastructure would be relatively widely 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
- high voltage substation
- BESS modules
- perimeter fencing
- permanent staff amenities.

The topography of the site and local area is gently undulating and there are not many nearby opportunities to view the site from a higher position, apart from the hilly terrain to the southeast. The nearest airfield is located in Forbes 35 km northwest of the site. No other certified or registered airfields are located within 50 km of the site. 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.

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 development is expected to have a minimal impact on nearby visual receivers.

Table 3.11 Reflectivity of different materials

Material	Approximate percentage of light reflected*
Snow	80
White concrete	77
Bare aluminium	74
Vegetation	50
Bare soil	30
Wood shingle	17
Water	5
Solar panels	5
Black asphalt	2

* Sourced from FAA (2010)

4 VISUAL IMPACT ASSESSMENT MANAGEMENT AND MITIGATION MEASURES

As outlined in Section 3.4.1, no specific mitigation measures to reduce the visual impacts on the six selected viewpoints and three residences are proposed, other than the exclusion of development from the far northern section of the site. However, general recommendations for minimising and managing visual impacts and maintaining the landscape character are discussed below.

4.1 Objectives and principles

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

- Adopt 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.
- Any urban design features should reflect and be sympathetic (complementary) to the existing historic, cultural and natural character of the area.
- Design lighting so as not to negatively impact on adjacent land uses (e.g. no light spill into adjacent rural properties affecting residences).

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

- Maximise the retention of existing visual screening opportunities.
- Revegetate areas disturbed by construction work, where possible.
- When revegetating, consider the potential to reflect similar vegetation types found in the area.
- Use materials and colours that reflect 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 such impacts are minimised during both construction and operation.

4.2 Design phase measures

As outlined in Section 3.4.1, no specific landscaping or visual screening treatments are proposed in relation to sensitive visual receivers. However, the following detailed design measures should be adopted to reduce the visual impact of the project:

- Exclude the far northern end of the site from development to avoid direct lines of site from the R1 residential compound.
- 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.
- Limiting disturbance and rehabilitating disturbed areas.
- 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 rehabilitation and decommissioning strategy will be implemented to return the site to its pre-existing condition.

5 REFERENCES

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Attachment 1 – Preliminary visual assessment calculations

Peninsula Solar Farm - Preliminary visual assessment calculations

Search radius	5000 m
Lowest point project site	263 m
Highest point project site	322 m
Solar array height	4 m

A	B	C	D	E	F	G	H	I
Receivers	Distance from the nearest point of site boundary (m)	Altitude of residences (m)	Altitude of nearest boundary (m)	Highest point on site - lowest point (m)	Height of residence - height of boundary (m)	Absolute value of column F (m)	Height difference between array and residences (m)	Column H plus solar panel height (m)
R1	323	265	264	59	1	1	60	64
R2	344	281	284	59	-3	3	62	66
R4	1557	286	303	59	-17	17	76	80
R6	3270	274	262	59	12	12	71	75
R7	3598	316	273	59	43	43	102	106
R8	2635	287	287	59	0	0	59	63
R9	4043	284	303	59	-19	19	78	82
R10	4918	280	282	59	-2	2	61	65
R11	4238	270	303	59	-33	33	92	96
R12	4574	264	263	59	1	1	60	64
R13	4896	273	263	59	10	10	69	73
R14	4921	257	284	59	-27	27	86	90