Appendix F

Visual impact assessment

Limondale Sun Farm

Overland Sun Farming

Limondale Sun Farm

Visual Impact Assessment

Prepared for Overland Sun Farming | 7 April 2017

Limondale Sun Farm

Visual Impact Assessment

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Limondale Sun Farm

Final

Report J16155RP1 | Prepared for OVERLAND Sun Farming Pty Ltd | 7 April 2017

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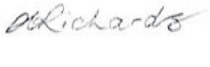
Signature			Signature	
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Executive Summary

OVERLAND Sun Farming Pty Ltd (OVERLAND) proposes to develop the Limondale Sun Farm, a large-scale solar photovoltaic (PV) generation facility and associated infrastructure in the Murray Darling Depression bioregion of south-western NSW (the project). OVERLAND proposes to develop the project on a site within the Balranald Shire local government area, approximately 14 kilometres south of the township of Balranald. The project includes the development, construction and operation of a solar PV electricity generation facility, which comprises the installation of PV solar panels and associated infrastructure on the site.

A visual assessment was completed for the project to assess impacts from eight representative viewpoints surrounding the site. The viewpoints were selected to represent views close to private residential properties and road corridors (ie Yanga Way and Windomal Road) nearest to the project's development footprint.

The assessment method adopted was based on methods outlined in the *Guidelines for Landscape and Visual Impact Assessment Third Edition* (2013) (the GLVIA) and the *Wind Energy: Visual Assessment Bulletin AB 01 For State significant wind energy development* (2016) (the VA Bulletin).

To determine potential visibility of project infrastructure, a viewshed analysis was also completed. The viewshed analysis simulates the effects of existing vegetation (based on aerial imagery and ground-truthing) and topography on screening views. The results of the viewshed analysis indicate that infrastructure may be visible from four of the assessed viewpoints, namely viewpoints 4, 5, 6 and 8.

The development of the project will result in some changes to the visual landscape. Visual impacts will occur during the construction and operation stages. The visual landscape will be altered from its current state for the duration of operation of the project. The visual assessment determined that, of the viewpoints assessed, infrastructure may be visible from four viewpoints; viewpoints 4, 5, 6 and 8. The distance of the development footprint from these viewpoints ranges from 0.9 km to 5.3 km. Based on the presence of vegetation and topography, combined with the relatively low height of the project's infrastructure and distance, visual impacts will be minimal.

Given the minimal visual impact of the project, a draft landscaping plan for on-site perimeter planting has not been prepared and is not considered necessary.

Due to existing vegetation, undulation in the landscape, and the relatively low height of the dominant project infrastructure, namely the PV solar panels, the project's infrastructure will be relatively shielded from view at the majority of the viewpoints assessed as part of this visual assessment. This visual assessment concludes that the project will not have a significant visual impact on the locality.

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1 Introduction

1.1 Overview

OVERLAND Sun Farming Pty Ltd (OVERLAND) proposes to develop the Limondale Sun Farm, a large-scale solar photovoltaic (PV) generation facility and associated infrastructure in the Murray Darling Depression bioregion of south-western NSW (Figure 1.1) (the project). OVERLAND proposes to develop the project on a site within the Balranald Shire local government area (LGA), approximately 14 kilometres (km) south of the township of Balranald.

The project is a State significant development (SSD) under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). A development application (DA) for the project is required to be submitted under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The NSW Minister for Planning, or the Minister's delegate, is the consent authority.

An environmental impact statement (EIS) is a requirement of the approval process. This Visual Impact Assessment (VIA) report forms part of the EIS. It documents the visual assessment methods and results and the initiatives built into the project design to avoid and minimise visual impacts.

1.2 Project description

The project includes the development, construction and operation of a solar PV electricity generation facility, which comprises the installation of PV solar panels and associated infrastructure on the site.

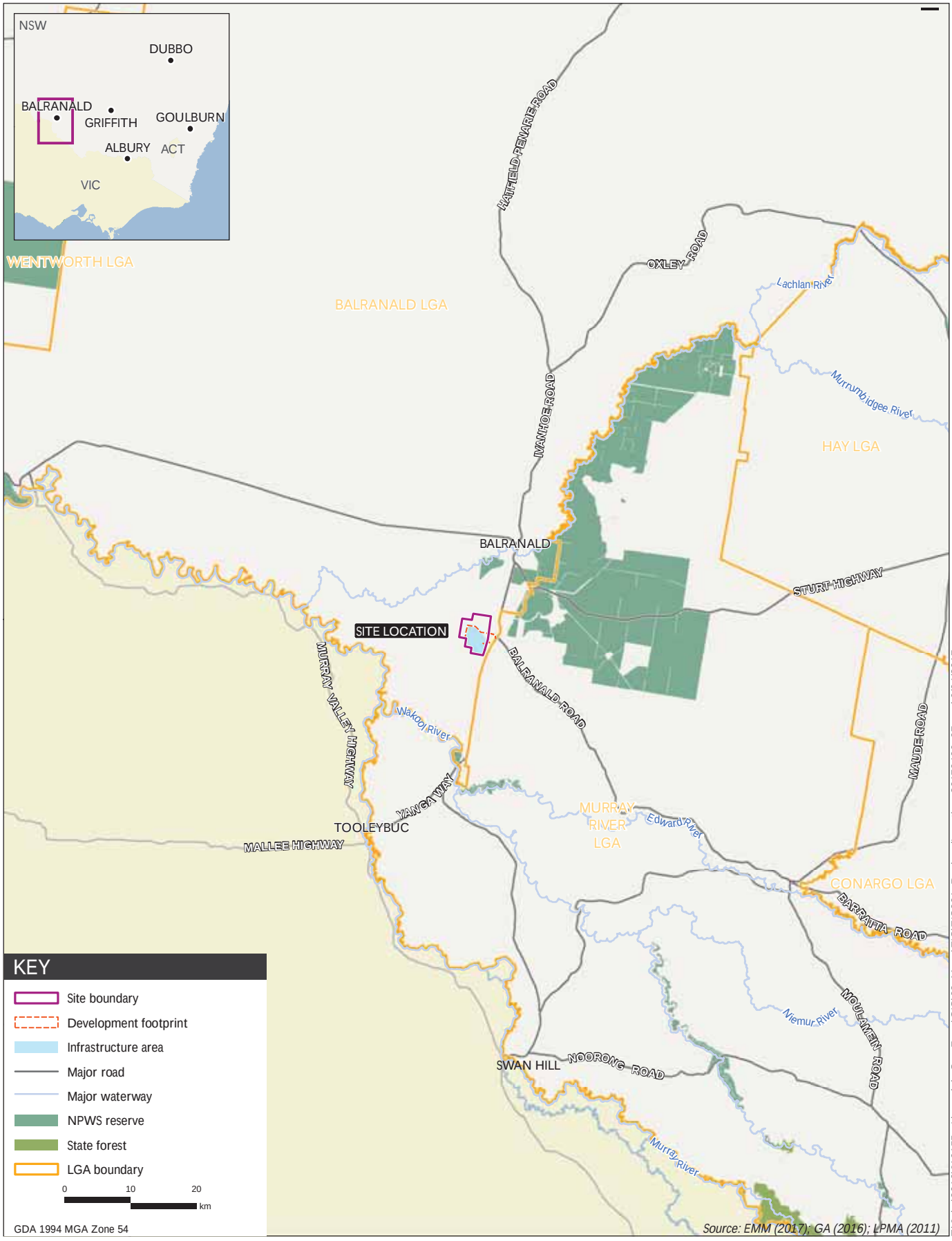
The project will connect to the Transgrid 220 kilovolt (kV) electricity distribution network that originates at the Balranald Substation. The electricity and associated environmental products generated from the project will be sold to one or more of a registered energy retailing organisation, large energy users (governmental or private) or to the National Electricity Market that is managed by the Australian Energy Market Operator.

The project will have an estimated nominal capacity in the order of 250 megawatt (MW) and once operational will generate enough electricity to power up to 100,000 homes each year.

The project comprises the following key components:

- a network of PV solar panel arrays;
- electrical collection systems, switchyard and control room;
- a management hub, including demountable offices and amenities and equipment sheds;
- parking and internal access roads; and
- easement and connection infrastructure to the Balranald Substation.

The development footprint and conceptual infrastructure layout has been refined on the basis of grid connection studies, environmental constraints identification and design of project infrastructure with the objective of developing an efficient project that avoids and minimises environmental impacts. The development footprint and conceptual infrastructure layout are discussed in Chapter 4.



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Regional project location

Limondale Sun Farm
Visual impact assessment
Figure 1.1

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1.3 Assessment guidelines and requirements

This VIA has been prepared in accordance with the relevant governmental assessment requirements, guidelines and policies, and in consultation with the relevant government agencies.

There are no Commonwealth, NSW or local government planning policies, guidelines or standards directly applicable to this assessment. The VIA was prepared with reference to the methods outlined in:

- *Guidelines for Landscape and Visual Impact Assessment Third Edition* (2013) (the GLVIA), prepared by the Landscape Institute and Institute of Environmental Management and Assessment; and
- *Wind Energy: Visual Assessment Bulletin AB 01 For State significant wind energy development* (2016) prepared by the NSW Department of Planning and Environment (the VA Bulletin).

It is noted that the VA Bulletin specifically relates to assessment of visual impacts of wind farms in NSW, however a number of the methods for describing visual sensitivity and landscape character are considered to be relevant to this assessment. In the absence of other directly applicable guidelines/standards, the relevant elements from the VA Bulletin have been adopted for this assessment.

The VIA was prepared in accordance with the requirements of the NSW Department of Planning and Environment (DP&E). These were set out in the Secretary's Environmental Assessment Requirements (SEARs) for the project, issued on 4 November 2016. The SEARs identify matters which must be addressed in the EIS. A copy of the SEARs is attached to the EIS as Appendix A, while Table 1.1 lists the individual requirements relevant to this VIA and where they are addressed in this report.

Table 1.1 Visual assessment – related SEARs

Requirement	Section addressed
Visual- including:	
• An assessment of the likely visual impacts of the development (including any glare, reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain, including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners.	Chapter 5

To inform preparation of the SEARs, DP&E invited other government agencies to recommend matters to be addressed in the EIS. These matters were taken into account by the Secretary for DP&E when preparing the SEARs. Copies of the government agencies' advice to DP&E were attached to the SEARs.

One agency, the NSW Roads and Maritime Services (RMS), raised a matter relevant to the visual assessment, listed in Table 1.2.

Table 1.2 RMS's comments – assessment recommendations

Requirement	Section addressed
Given the type and scale of the proposed development and its proximity to Yanga Way it is considered appropriate that issues relating to potential for distraction of, and for glare impacts on, passing motorist be addressed in any submission. As a minimum, consideration should be given to the establishment and maintenance of a visual buffer, such as a vegetated buffer, within the subject site along its frontage to any public road, particularly Yanga Way.	Chapter 5

1.4 Structure of the report

This report is structured as follows:

- Chapter 2 describes the visual impact methodology used in the preparation of this report;
- Chapter 3 describes the existing landscape within which the project will be sited;
- Chapter 4 describes the character of the visual components of the project and the staging of project development;
- Chapter 5 describes the impacts of the project from representative viewpoints in and around the site; and
- Chapter 6 provides conclusions.

2 Visual impact method

2.1 Overview

The assessment method used in this report is based on methods outlined in the GLVIA and VA Bulletin. The assessment involves information review, consultation, fieldwork observations, photography, computer-based data processing and analysis, and subjective professional judgement. The assessment involved seven key stages:

Stage 1: **View type and context** – the existing landscape baseline is described noting its character and complexity;

Stage 2: **Visibility baseline assessment** – the zone of visual influence of the project is established, where appropriate through the use of computer generated zones of theoretical visibility, based on topographical data, or through fieldwork analysis. This establishes the locations where views of the project may be possible. Fieldwork is undertaken to establish the types and locations of receptors within this theoretical zone;

Stage 3: **Viewpoint selection** – representative public and private viewpoints of the site are selected and the project's level of exposure to them is determined;

Stage 4: **Magnitude of change** - the magnitude of visual change and the changes arising from the project are assessed and the need for project modifications or other mitigation measures evaluated;

Stage 5: **Visual sensitivity** – the capacity of the landscape to absorb change without a loss of quality (its visual sensitivity) is determined;

Stage 6: **Evaluation of significance** – the significance of change in the landscape is a function of the magnitude of change when considered against the view type/context and the sensitivity of a receptor; and

Stage 7: **Mitigation** – the modified and mitigated project (if applicable) is assessed and final visual impacts are described and illustrated and their significance documented.

Details of each of the above stages are provided below.

2.2 Stages in the assessment method

2.2.1 Stage 1 - View type and context

This stage involves recording and analysis of existing landscape features, characteristics, the way in which the landscape is experienced and the value or importance of the landscape and visual resource in the site. The landscape character is determined by the number, size, type and contrast of elements present. Typically the key elements are topography, vegetation, water features and built elements. Other factors that are important are the consistency of these elements and whether they have developed progressively overtime and become well integrated into a harmonious landscape. In addition, the presence of change and whether the landscape is experiencing large scale development (such as residential growth on the urban fringe), needs to be considered.

The context is a primary factor in the visual sensitivity of the view. Generally sites within higher contrasting landscapes have greater ability to absorb change, whereas sites within a uniform or highly ordered landscape have higher sensitivity and less potential for absorption.

Reference has been made to the landscape characters defined in the VA Bulletin and descriptions provided in the *Interim Biogeographic Regionalisation for Australia* (IBRA). The GLVIA also sets out guidance in relation to landscape baseline at paragraph 5.3:

> Baseline studies for assessing landscape effects require a mix of desk study and field work to identify and record the character of the landscape and the elements, features and aesthetic and perceptual factors which contribute to it. They should also deal with the value attached to the landscape....The methods used should be appropriate to the context into which the development proposal will be introduced and in line with current guidance and terminology.

2.2.2 Stage 2 - Visibility baseline assessment

Baseline studies for visual effects establish the area in which the development may be visible, who will see the development, the viewpoints that will be affected and the nature of the views at those points. Viewshed analysis using GIS has been used to simulate visibility from viewpoints and the surrounding landscape.

2.2.3 Stage 3 - Viewpoint selection

Viewpoints are selected to provide a representative sample of the likely visual landscape changes on the different users of the areas surrounding the project and their visual exposure to various project elements. Viewpoints that are considered to have potential exposure to various project elements or areas available to public access, such as roads, and private viewpoints from residential properties surrounding the project, have been identified through GIS mapping, fieldwork and desktop analysis.

2.2.4 Stage 4 - Magnitude of change

The magnitude of change on the visual landscape is one factor in determining the significance of visual impacts of the project. In accordance with GLVIA, this visual assessment considered the following criteria in determining the magnitude of change on a receptor:

- whether the impact is temporary or permanent – impacts that are for a limited duration are considered less significant than those which occur for an extended period or are permanent;
- scale of change – the loss or addition of features in the view and changes in the proportion of the view affected by the project;
- degree of contrast – level of integration of new features with existing or remaining landscape elements, having regard to form, scale, height, colour, and texture;
- distance of the viewer from the altered elements in the landscape – close proximity to an altered landscape will increase the significance for private residences. In the case of motorists, mid ground changes can be greater than foreground elements as they can result in longer viewing times. Glare and reflection has also been considered in regards to motorists;
- viewing direction – whether the change is to the primary view from the receptor;

- extent of view affected – impacts that are visible over a greater portion of a view are more significant than those where only a part of the view is impacted. Intervening topography and vegetation will also affect the magnitude of change; and

- length of viewing time – views from a residence are constant whereas some views from roadways as experienced by motorists may be brief dependent upon speed and viewing direction.

2.2.5 Stage 5 - Visual sensitivity

Visual sensitivity is a measure of the landscape's ability to absorb development without a significant change in the character. It is a function of the view type and context. In this assessment, the major factor influencing visual sensitivity is the level of contrast between the project related infrastructure and the rural landscape setting in which it will be set.

The physical characteristics of the landscape, including existing development features, are integral components in determining the visual sensitivity. For example, a low visual sensitivity would enable a modification or addition to be made to the landscape which would only cause minimal contrast and result in a high level of integration with the surrounding landscape. Similarly, a high visual sensitivity would mean the same modification or addition to the surrounding landscape would cause high contrast to the surrounding landscape.

Visual sensitivity has been assessed based on the viewer sensitivity level classification given in the VA Bulletin, presented in Table 2.1.

Table 2.1 Viewer sensitivity level classification

Sensitivity	Description
High	Residential areas and rural villages (defined as land zoned R1, R2, R3, R4, R5 and RU5 in the NSW Standard Local Environmental Plan [LEP]).
	Recreation, cultural or scenic sites and viewpoints of National or State significance.
	Any buildings, historic rural homesteads/residences on the State or local Government Heritage List.
Moderate	Rural dwelling.
	Tourist and visitor accommodation (definition in the NSW Standard LEP).
	Recreation, cultural or scenic sites and viewpoints of regional significance.
Low	Interstate and state passenger rail lines with daily daylight services.
	State highways, freeways and classified main roads, classified tourist roads.
	Land management roads with occasional recreation traffic.
	Walking tracks of moderate local significance or infrequent recreation usage.
	Other low use and low concern viewpoints and travel routes.
	Navigable waterways.

The VA Bulletin establishes sensitive land use designations, including key National and State sensitive land use designations and potentially sensitive land use zones under the local environmental plans prepared under the EP&A Act. National and State sensitive land use designations and their land use zones are identified in Table 2.2.

Table 2.2 Sensitive land use designations

National and State sensitive land use designations	LEP zones as per the NSW Standard LEP	
World Heritage Areas	RU5 Village	RE2 Private Recreation
National Parks	R1 General Residential	E1 National Parks and Nature Reserves
National Reserve System reserves	R2 Low Density Residential	E2 Environmental Conservation
Coastal Zone (under the NSW *Coastal Protection Act 1979*)	R3 Medium Density Residential	E3 Environmental Management
Marine estate (under the NSW *Marine Estate Management Act 2014)*	R4 High Density Residential	E4 Environmental Living
Commonwealth Heritage List Sites	R5 Large Lot Residential	W1 Natural Waterways
State Heritage Register Sites	SP3 Tourist	W2 Recreational Waterways

Notes: Table 3 from VA Bulletin (DP&E 2016)

The site is not within a sensitive land use zone; the nearest sensitive land use zone is approximately 2.7 km east of the site and is zoned E1 National Parks and Nature Reserves under the Wakool Local Environmental Plan 2013 (Wakool LEP).

2.2.6 Stage 6 - Evaluation of significance

The significance of a change in the landscape is a function of the magnitude of that change when considered against the view type/context and the sensitivity of a receptor. Typically, a noticeable change in the landscape in a rural or natural landscape, combined with a high visual sensitivity, would be considered to be significant, whereas a change in an already heavily modified landscape be considered slight or moderate.

Table 2.3 illustrates how the magnitude of a change in the landscape is assessed, and its significance rated, against the sensitivity of a viewpoint.

Table 2.3 Evaluation of significance matrix

Magnitude of change	**Visual sensitivity**		
	High	**Moderate**	**Low**
High	Substantial	Moderate/ Substantial	Moderate
Moderate	Moderate/ Substantial	Moderate	Slight/ Moderate
Low	Moderate	Slight/ Moderate	Slight
Negligible	Slight	Slight	Negligible
Key:	Significant	Not significant	

The primary assessment tools for determining the significance of impact of the project were the site inspection and photographs of the views from the selected viewpoints. This enabled an assessment of potential visual impact, taking into consideration the nature of the landscape, topography, the distance between the viewpoint and the proposed infrastructure, as well as the type of view experienced.

2.2.7 Stage 7 - Mitigation

The final step in the assessment process was to determine additional measures that could be incorporated into the design of the project to ameliorate, or, where possible, eliminate the visual impact of the proposed activity.

Mitigation measures can be in several forms including:

- design of project infrastructure to reduce the contrast with the surrounding environment;
- use of visual buffers and screening by planting vegetation; and
- designing infrastructure to screen operations and lighting.

Mitigation measures that have been incorporated into the design of the project are discussed in Section 4.7 of this report.

3 Site description

3.1 Description of the site

The site is within the Balranald Shire LGA in the Murray Darling Depression bioregion of south-western NSW, approximately 14 km south of the township of Balranald (Figure 1.1). The site is west of Yanga Way and comprises approximately 2,049 hectares (ha). The development footprint is defined as the land area within the site where project infrastructure will be constructed and operate for the project life. The development footprint has been refined through the project design process informed by technical investigations to avoid environmental constraints (primarily remnant vegetation and Aboriginal heritage).

The site is zoned RU1 Primary Production under the Balranald Local Environmental Plan 2010 (Balranald LEP). It has been highly modified by previous and current land uses, including land clearing, cropping, and livestock grazing. It is currently used for broad acre cropping, most recently hay.

The site's eastern boundary is adjacent to a parcel of Crown land approximately 1.5 km wide, which forms part of a travelling stock reserve (TSR) that extends further north and south (Figure 3.1). Yanga Way runs through this Crown land and provides access from the site to the regional road network including the Sturt, Murray Valley and Mallee highways (Figure 1.1).

Transgrid's Balranald Substation is within the TSR, approximately 500 m from the site's eastern boundary. Transgrid's 220 kV transmission line, which runs from Darlington Point to Broken Hill, traverses the site (see Figure 3.1).

The site is within the Murrumbidgee catchment's flat western plains, south of the Murrumbidgee River. Elevation across the site is more variable than the surrounding area, ranging between 6270 m above sea level, with elevation generally increasing from north to south. Land within the development footprint is relatively flat.

3.2 Surrounding land uses

The site is part of the Murrumbidgee catchment. Land use within this catchment is dominated by extensive agricultural operations with grazing occupying 64.4% of the total catchment area (Office of Water 2011). Dryland cropping and horticulture (15.5%); conservation (6.4%); and irrigation (5.1%) are also prevalent across the catchment area (Office of Water 2011). Agricultural production activities undertaken in the Balranald Shire LGA are dominated by sheep grazing and grain production, namely cereals (BSC 2012).

The site is in a semi-rural setting, with the wider region characterised by grazing and cropping properties, large-scale farm businesses (including a property adjacent to the site's northern boundary, which is owned and operated by goFARM Australia Pty Ltd [goFARM]), conservation areas, forestry (including a forest logging business approximately 5 km north of the site), scattered rural residences, villages and towns and major transport routes such as the Sturt Highway. The majority of land surrounding the site is zoned RU1 Primary Production under the Balranald LEP (Figure 3.2).

Prominent features in the surrounding landscape include (see Figure 3.1):

- Yanga National Park (which is part of the Murrumbidgee Valley National Park), which covers an area of approximately 76,000 ha (Figure 3.1). At its closest point, Yanga National Park is approximately 3 km east of the site, with additional areas north and north-east of the site. This area is zoned E1 National Parks and Nature Reserves under the Balranald LEP and the Wakool LEP. Within Yanga National Park, visitors are able to gain access to a number of different facilities including:
    - Regatta Beach picnic area on the western shore of Yanga Lake, approximately 5.4 km north-east of the site;
    - Yanga Homestead precinct on the northern shore of Yanga Lake, approximately 8 km north-east of the site, which also includes the Yanga Lake walking track and viewing deck;
    - Mamanga campground on the banks of the Murrumbidgee River, approximately 8 km north of the site; and
    - Yanga Woolshed and the Woolshed picnic area on the banks of the Murrumbidgee River, approximately 8.6 km north of the site.
- Murrumbidgee Valley State Conservation Area, which covers an area of 34,759 ha (Figure 3.1). At its closest point, Murrumbidgee Valley State Conservation Area is approximately 10 km east of the site. This area is zoned E1 National Parks and Nature Reserves under the Wakool LEP.

No notable scenic or significant vistas within proximity of the site have been identified. Views to the site from the places of local environmental heritage significance listed within the Balranald LEP and the Wakool LEP will not be possible due to the distance to the site from these places and the relatively low height of the project's infrastructure.

3.3 Balranald Substation and other electricity transmission infrastructure

Transgrid's Balranald Substation is within the TSR, approximately 500 m from the site's eastern boundary (Figure 3.1). A network of electricity transmission lines connect into the Balranald Substation, and are prominent features in the surrounding landscape. Transgrid's 220 kV transmission line, which runs from Darlington Point to Broken Hill, traverses the site (see Figure 3.1). This transmission line is supported by towers approximately 40 m high, spaced at approximately 400 m intervals and crosses Yanga Way close to the site. Other lower voltage overhead wiring also runs into and out of the Balranald Substation with wires traversing the TSR close to the site.

3.4 Rural dwellings

The nearest sensitive receptors are dwellings. The nearest receptor, R1, is approximately 2.9 km north of the development footprint, with a further five receptors, R2, R3, R4, R5 and R6, within approximately 6 km (see Figure 3.1). Receptor R5 is located within the boundary of the proposed Sunraysia Solar Farm (see Section 3.9).

3.5 Settlements and townships

Balranald is the largest town in the Balranald Shire LGA with a population of 1,159 and hosts the majority of the area's largest social, cultural and recreational events, which includes the 5 Rivers Outback Festival, held annually on the second weekend of October. The town is approximately 14 km north of the site.

Agriculture is the dominant industry of employment for Balranald's population, with school education and local government administration among the town's other major employers (ABS 2013). Though traditionally reliant on dry-land and irrigated agricultural production, the economy within the greater Balranald Shire LGA has experienced significant diversification to encompass horticulture, viticulture and organic agricultural production. Tourism has also become an important economic driver with domestic and international tourists attracted to the Yanga and Mungo National Parks, within the Balranald Shire LGA (BSC 2016).

3.6 Transport routes

Yanga Way (also known as Balranald-Tooleybuc Road and Mallee Highway), to the east of the site, is a State funded main road that provides an important link between Balranald and the Sturt Highway in the north and Stony Crossing Road, and the Murray Valley and Mallee highways in the south. The road extends over 50 km and crosses the border of NSW and Victoria at Tooleybuc. At the site, Yanga Way is a single carriageway with a sealed surface. It is a designated B-double route and is also part of RMS Livestock Loading Scheme, which provides increased mass limits for livestock loads (RMS 2016). This designation permits the use of Yanga Way for heavy vehicle movements including 19 m, 23 m and 25 m B-double vehicles.

Current daily traffic estimates indicate that between 396 and 596 vehicles travel along Yanga Way per day, with the existing proportion of heavy vehicle traffic estimated to be approximately 29% (average) of all vehicle movements (refer to Appendix H of the EIS).

Windomal Road and Balranald Road are also in close proximity of the site and at their closest points are approximately 4 km west of the site's western boundary and 1.3 km east of the site's eastern boundary, respectively (Figure 3.1). These roads were considered as part of this visual assessment as motorists travelling along Windomal Road or approaching the T-intersection of Balranald Road and Yanga Way may have partial, distant views of the project's infrastructure.

Existing daily traffic movements along Windomal Road and Balranald Road are not known. However, based on their function within the road hierarchy, it is estimated that approximately 100 200 vehicles and up to 100 vehicles travel along Windomal Road and Balranald Road, respectively.

There is no active rail service providing access to the area.

3.7 Air traffic

The Balranald Airport is approximately 16 km north of the project infrastructure (Figure 3.1). There are no regularly scheduled services into or out of Balranald Airport.

3.8 Night lighting

Existing sources of night lighting in the immediate vicinity of the site are minimal due to its rural setting. The main sources of lighting would be from rural residential properties, farm machinery and vehicles on roads. The headlamps from vehicles travelling north-south along Yanga Way would provide a modest source of lighting in the evening and night time hours.

The project will not require permanent night lighting. Temporary, localised night lighting may be required during general maintenance activities conducted during the operation stage of the project. If required, lighting will be managed to minimise impacts on surrounding areas.

3.9 Other developments

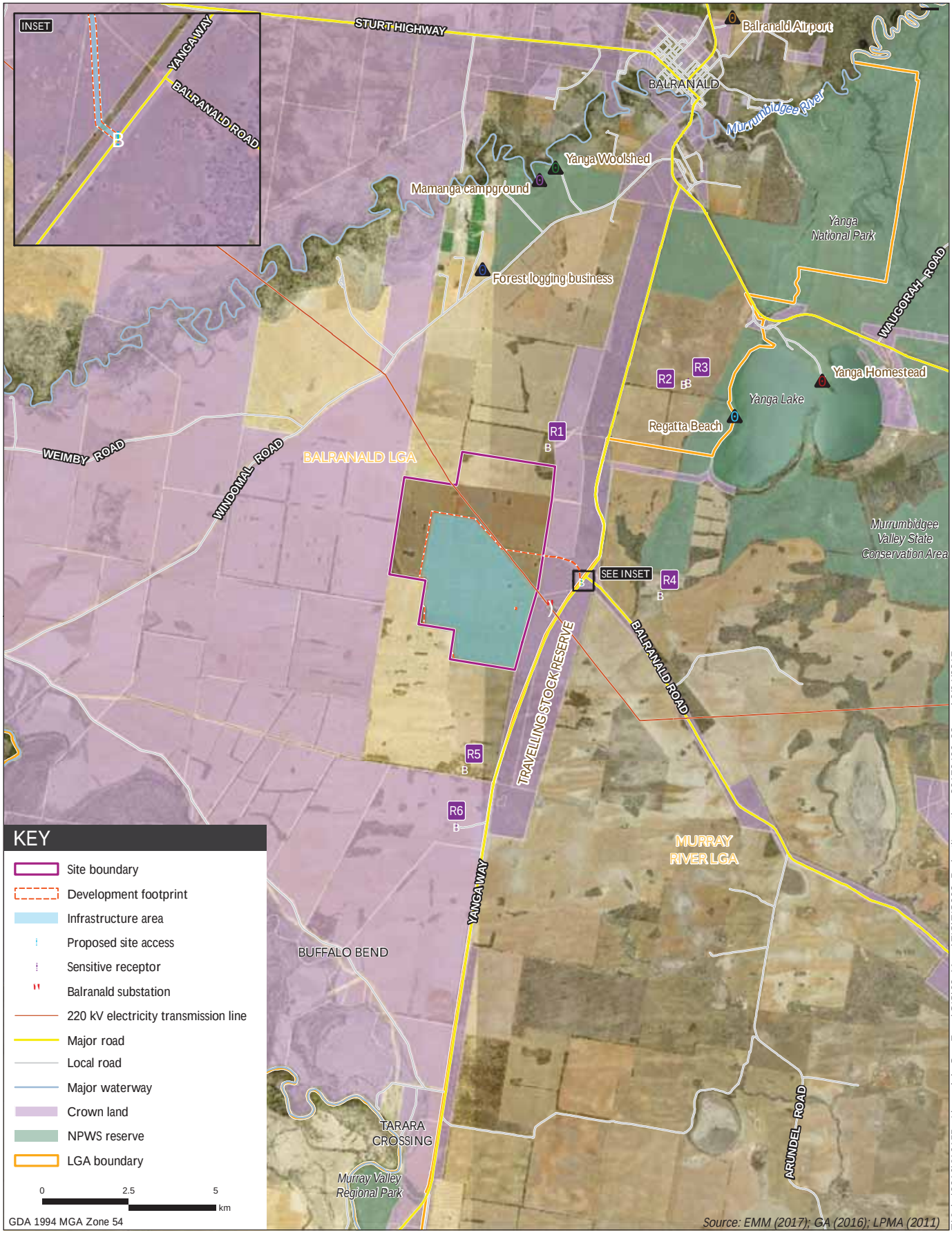
Other significant proposed and approved projects in proximity to the site are:

- Sunraysia Solar Farm (SSD 7680) – Sunraysia Solar Farm Two Pty Ltd proposes to develop a commercial scale solar PV farm with a capacity of around 200 MW. The proposed solar farm will be on Lots 9, 10, 11 and 14 of DP 751179, adjacent to the southern boundary of the site, and covers an area of approximately 1,000 ha (NGH Environmental 2017). The development would include the installation of approximately 750,000 PV solar panels at a height of 1.5–3 m (NGH Environmental 2017). The operation of the Sunraysia Solar Farm will require the construction of an overhead transmission line to connect the proposed solar farm to the Balranald Substation (NGH Environmental 2017). This connection infrastructure will traverse the TSR and will be adjacent to the project's eastern site boundary for a length of approximately 1.3 km.

  The EIS for the proposed Sunraysia Solar Farm was available on public exhibition from 4 February 2017 to 5 March 2017. Receptor R5 is located within the boundary of the proposed Sunraysia Solar Farm (see Figure 3.1).

- goFARM Australia Pty Ltd (goFARM) temporary accommodation facility and expanded agricultural operations – goFARM is seeking consent from BSC to expand its agricultural operation on the property immediately north of the site. The DA involves the construction of a temporary accommodation camp for the goFARM Maffra Almond Orchard project, on Lot 21 DP 751173, adjacent to the site's northern boundary. The civil works for the project are expected to occur in 2017. If approved, the facility will accommodate up to 40 people who would be involved in the development of a large almond and pistachio crop (approximately 7,000 ha). Any additional workers would likely be accommodated in Balranald township.

  OVERLAND has engaged with goFARM as part of the consultation process for the project. Receptor R1 is located on the property 'Maffra', and is part of goFARM's operations (see Figure 3.1).



Location of the Limondale Sun Farm

Limondale Sun Farm
Visual impact assessment
Figure 3.1

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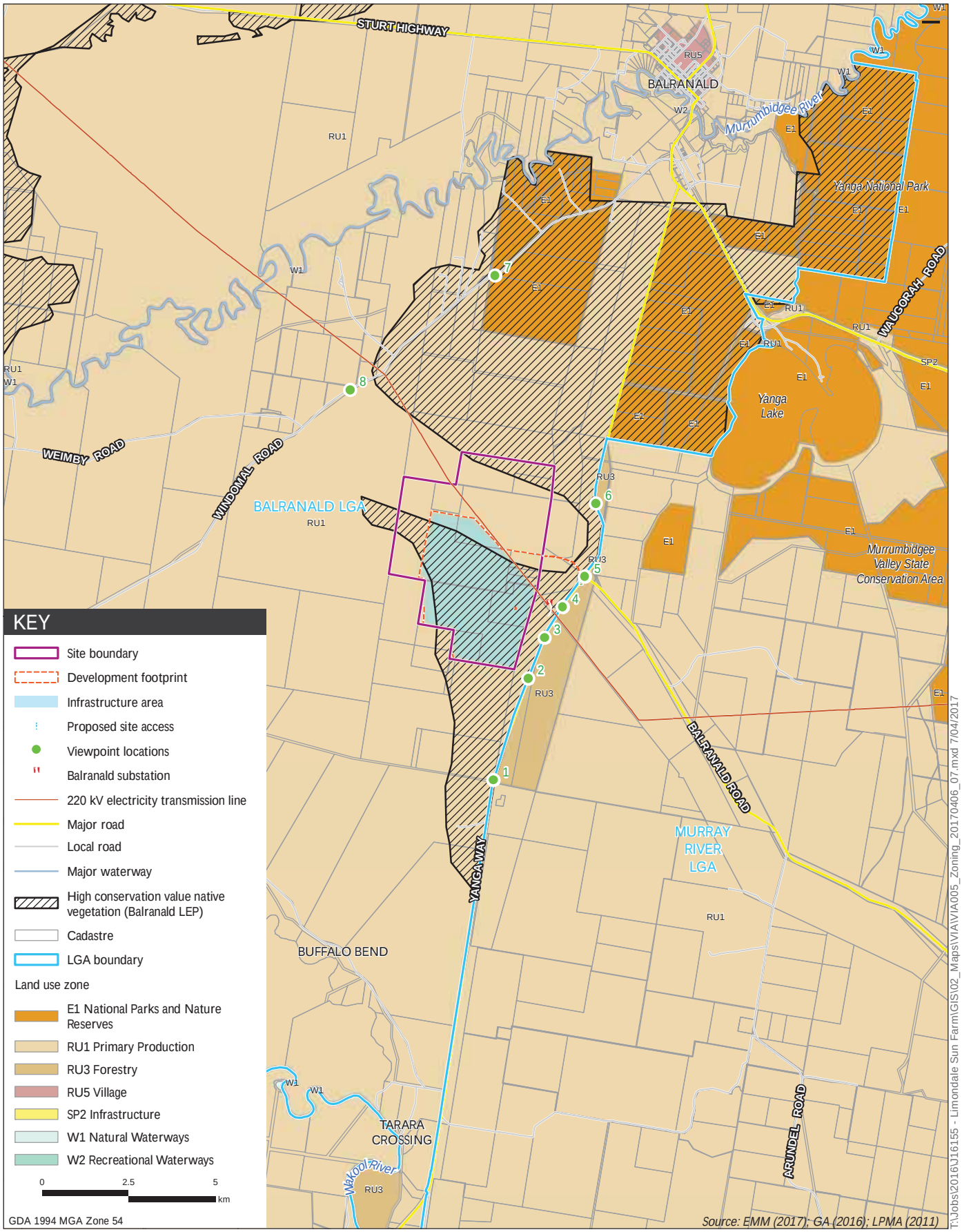

Land use zoning
Limondale Sun Farm
Visual impact assessment
Figure 3.2

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4 Visual elements of the project

4.1 Development footprint

The development footprint within the site boundary (Figure 3.1) has been refined on the basis of grid connection studies, environmental constraints identification and design of project infrastructure.

OVERLAND has designed the project based on its experience leading benchmark renewable energy and infrastructure projects. The site location, capacity of the project, design and layout of infrastructure and connection to the electricity grid have been refined through an evaluation process both prior to and during preparation of this VIA and the associated EIS. The evaluation process has considered a range of factors, including:

- availability of solar radiation;
- proximity to, and capacity of the electricity grid;
- availability of sufficient land area with suitable physical characteristics;
- identification and avoidance of environmental constraints; and
- placement of infrastructure to minimise land use conflicts with landholders.

Specifically, the parcels of land which comprise the development footprint (as defined in Section 3.1), and the placement of infrastructure including PV solar panels, inverters, electrical collection system and switchyard and easement and connection infrastructure have been identified through detailed consultation with the landholder, to minimise visual impacts and land use conflicts and enable agricultural production and land management practices to continue on surrounding land.

4.2 Site preparation

Due to the development footprint's relatively flat terrain and predominantly cleared landscape, limited site preparation and civil works will be required. Site establishment works and preparation for construction will include:

- the establishment of a temporary construction site compound in a fenced off area within the development footprint including:
  - a site office;
  - containers for storage; and
  - parking areas;
- construction of access tracks and boundary fencing;
- site survey to confirm infrastructure positioning and placement; and
- where necessary, additional geotechnical investigations to provide information specific to the selected tracking system, mountings, and foundation pile arrangement.

The site establishment works and preparation for construction outlined above are unlikely to result in significant visual impacts due to their temporary nature.

4.3 Construction

Upon completion of the site establishment and pre-construction activities described above, construction will typically be as follows:

- posts will be driven or screwed into the ground to provide support for the mounting framework required for the PV solar panels;
- foundations for the inverter blocks, switchyard and management hub structures will be prepared;
- underground cabling will be installed between the PV solar panels and the collection circuit (this cabling will carry power throughout the site, between the inverters and central electrical switchyard, which will be located in the management hub);
- PV solar panel frames will be assembled and mounted on top of the piles;
- PV solar panels, inverters, transformers and switchgear units will be installed;
- transmission infrastructure will be constructed between the project electrical switchyard and the Balranald Substation;
- the management hub will be constructed;
- permanent fencing and security will be constructed; and
- the temporary construction site compound will be removed.

The construction stage of the project will take approximately 12–15 months from the commencement of site establishment works and will result in a number of physical changes to the landscape, namely through the installation of infrastructure, the components of which are described in detail below.

4.4 PV solar panels

The project involves the installation of PV solar panels, arranged in a series of rows positioned to maximise the use of the solar resource available at the site (refer to Photograph 4.1). Approximately 868,000 PV solar panels could be accommodated within the development footprint. The final number of PV solar panels within the development footprint will be dependent on detailed design, and availability and commercial considerations at the time of construction.

PV solar panels will be constructed in a single axis tracking configuration, and will be fixed to and supported by ground-mounted framing (refer to Photograph 4.2). This configuration will allow the PV solar panels to rotate from east to west during the day tracking the sun's movement. The average height of the PV solar panel rows will be approximately 1.2 m. During the early morning and late afternoon tracking periods, the maximum height of the PV solar panel rows will be approximately 2 m.

The NSW Department of Industry – Division of Resources and Energy (DoI-DRE) (2016) states that solar farms are not considered to be reflective. To maximise the efficiency of the electricity production process, PV solar panels are designed to absorb as much light as possible.

One of the primary goals of PV solar panel design, manufacture and installation is to minimise the amount of light reflected. PV solar panels will be constructed of solar glass with an anti-reflective surface treatment.

Photograph 4.1 **Example of the proposed PV solar panel array layout**

Photograph 4.2 **Example of the steel frame structures used to support PV solar panels**

4.5 Connection infrastructure

The project will require the construction of a transmission line (with sections of the line either overhead or underground) to the Balranald Substation to export electricity produced at the site to the electricity grid. The Balranald Substation is approximately 500 m from the site's eastern boundary, illustrated in Figure 3.1. The transmission infrastructure will originate from the project switchyard and will be up to 650 m in length. The position of the transmission line is illustrated in the detailed infrastructure layout plan (Figure 4.1).

4.6 Access, parking and security

Access to the site will be from Yanga Way, utilising an existing cleared access track (Figure 4.1). A new intersection will be constructed approximately 100 m south of the intersection of Balranald Road and Yanga Way, and a short section of new access road will be required from the intersection to the existing access track.

An average of 204 daily vehicle movements is expected to travel to and from the site during construction. During operation, daily vehicle movements will be significantly less and are expected to total approximately 20 vehicles to and from the site. Further information about projected vehicle movements to and from the site throughout the project's construction and operation are available in Appendix H of the EIS.

Internal access roads of approximately 4–6 m width will be constructed to accommodate construction and operation traffic movements throughout the site. The indicative location of the access roads is illustrated in the detailed infrastructure layout plan (Figure 4.1).

During construction, a suitable number of parking spaces will be available within the temporary construction compound. The indicative location of the parking spaces is illustrated in the detailed infrastructure layout plan (Figure 4.1).

The site will be fenced off by a chain mesh fence, which will be approximately 1.8–2.4 m high. Fencing will restrict access to the site.

4.7 Mitigation of visual impacts

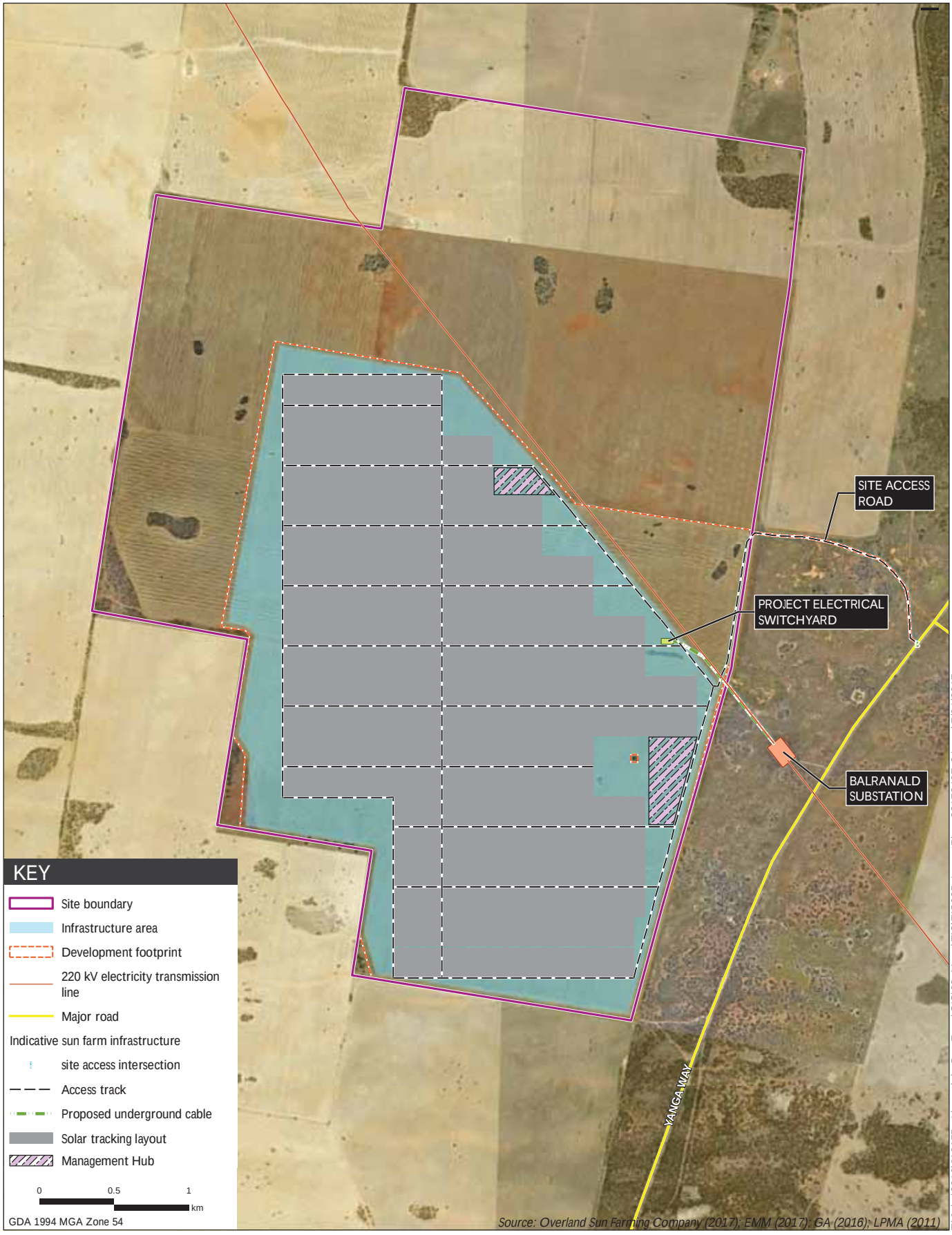
Development of the design has included general measures to reduce the degree of contrast between the project and the surrounding rural landscape, having regard to the form, scale, height, colour and texture of materials incorporated as part of the project's infrastructure. All of these amendments have reduced the overall visual impacts. This assessment has led to further refinement of the project to reduce visual impacts through consultation with surrounding landholders.

4.7.1 Colour of materials

Suitable colours will be chosen for project infrastructure to minimise visual impacts. Buildings and materials for site amenities will be made from colorbond or similar. These buildings and materials will be designed to be consistent with the local farming landscape and will be similar to existing farm sheds located in the surrounding area.

4.7.2 Night lighting

As noted in Section 3.6, the project will not require permanent night lighting. Temporary, localised night lighting may be required during general maintenance activities conducted during the operation stage of the project. If required, lighting will be managed to minimise impacts on surrounding areas.



Infrastructure layout plan

Limondale Sun Farm

Visual impact assessment

Figure 4.1

EMM

5 Visual assessment

5.1 Assessed viewpoints

Representative viewpoints for assessment were selected based on desktop analysis and site inspections undertaken on 31 January 2017 and 1 February 2017. Views of the site from representative viewpoints were ground-truthed and photographed. Viewpoints were selected based on:

- proximity to the site and, more specifically, the project's development footprint;
- the location of sensitive receptors (ie private dwellings);
- the positioning of road corridors and potential impacts on passing motorists;
- local topography; and
- existing vegetation screening.

The locations of the eight viewpoints are illustrated in Figure 5.1. The rationale for the selection of each of the viewpoints analysed are summarised in Table 5.1.

Table 5.1 Assessed viewpoints and sensitive receptors

Assessment location	Viewpoint type	Rationale for selection
Viewpoint 1	Dwellings	Views are representative of private dwellings to the south of the site (see Figure 5.1), including: R5 – 3 km; and R6 – 4.7 km. This location has also been identified as the site access point for the proposed Sunraysia Solar Farm (refer to Section 3.2).
Viewpoint 2	Motorist	Views are representative of those experienced by motorists travelling north along Yanga Way. This viewpoint was selected on the basis that motorists travelling north along Yanga Way at this location may experience limited views of project infrastructure.
Viewpoint 3	Motorist	Views are representative of those experienced by motorists travelling along Yanga Way. This viewpoint was selected on the basis that motorists travelling north and south along Yanga Way at this location may experience limited views of project infrastructure.
Viewpoint 4	Motorist	Views are representative of those experienced by motorists travelling south along Yanga Way. This viewpoint was selected on the basis that motorists travelling south along Yanga Way at this location may experience limited views of project infrastructure.
Viewpoint 5	Motorist	Views are representative of those experienced by motorists travelling south along Yanga Way. This viewpoint was selected on the basis that motorists travelling south along Yanga Way at this location may experience limited views of project infrastructure. Views from this location are also representative of those experienced by stationary motorists waiting to exit Balranald Road and turn left or right on to Yanga Way (Figure 2.1). The existing traffic movements using the intersection from the Balranald Road direction are not known but are assumed to be approximately 100 daily vehicle movements (refer to Appendix H of the EIS). This location is approximately 100 m north of the proposed site access for the project.

Table 5.1 Assessed viewpoints and sensitive receptors

Assessment location	Viewpoint type	Rationale for selection
Viewpoint 6	Motorist	Views are representative of those experienced by motorists travelling south along Yanga Way. This viewpoint was selected on the basis that motorists travelling south along Yanga Way at this location may experience limited views of project infrastructure.
Viewpoint 7	Motorist Industry Dwellings	Views are representative of those experienced by motorists travelling along Windomal Road, north of the site. This viewpoint was selected on the basis that motorists travelling along this road corridor may experience limited views of project infrastructure. The existing traffic movements using Windomal Road are not known but are assumed to be approximately 100–200 daily vehicle movements. This location is approximately 200 m east of the forest logging business north of the site (refer to Section 3.2 and Figure 3.1). This location is also representative of views from two private dwellings outside of the 5 km radius considered as part of this visual assessment.
Viewpoint 8	Motorist	Views are representative of those experienced by motorists travelling along Windomal Road, north-west of the site. This viewpoint was selected on the basis that motorists travelling along this road corridor may experience limited views of project infrastructure. The existing traffic movements using Windomal Road are not known but are assumed to be approximately 100–200 daily vehicle movements.

For the viewpoints representative of motorists on Yanga Way, daily traffic estimates indicate that between 396 and 596 vehicles travel along this route daily (refer to Appendix H of the EIS).

OVERLAND engaged with the owners of the closest sensitive receptor, R1 located to the north of the site, to discuss the potential visibility of the project infrastructure from this location. The property owner, goFARM, confirmed that there would be 'zero visual impact from the Maffra [R1] residence'. Representatives from goFARM confirmed during discussions that they did not have concerns regarding visual changes to the landscape from this residence.

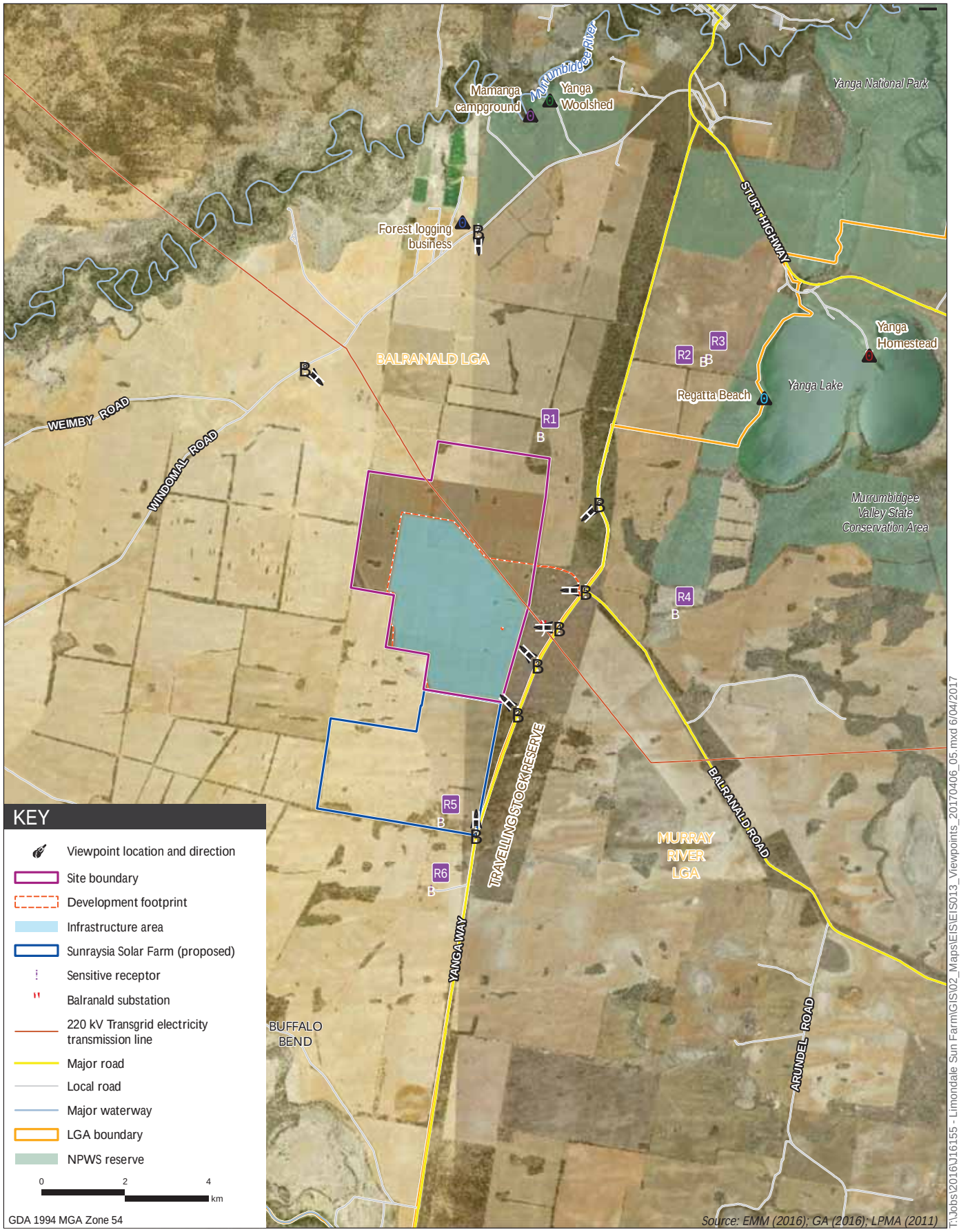
5.2 Construction impacts

A description of the site establishment and construction activities associated with the project is provided in Chapter 4.

As noted in Section 4.2, due to the development footprint's relatively flat terrain and predominantly cleared agricultural landscape, limited site preparation and civil works will be required. The site establishment works and construction activities will not have any significant visual impacts due to their temporary nature.

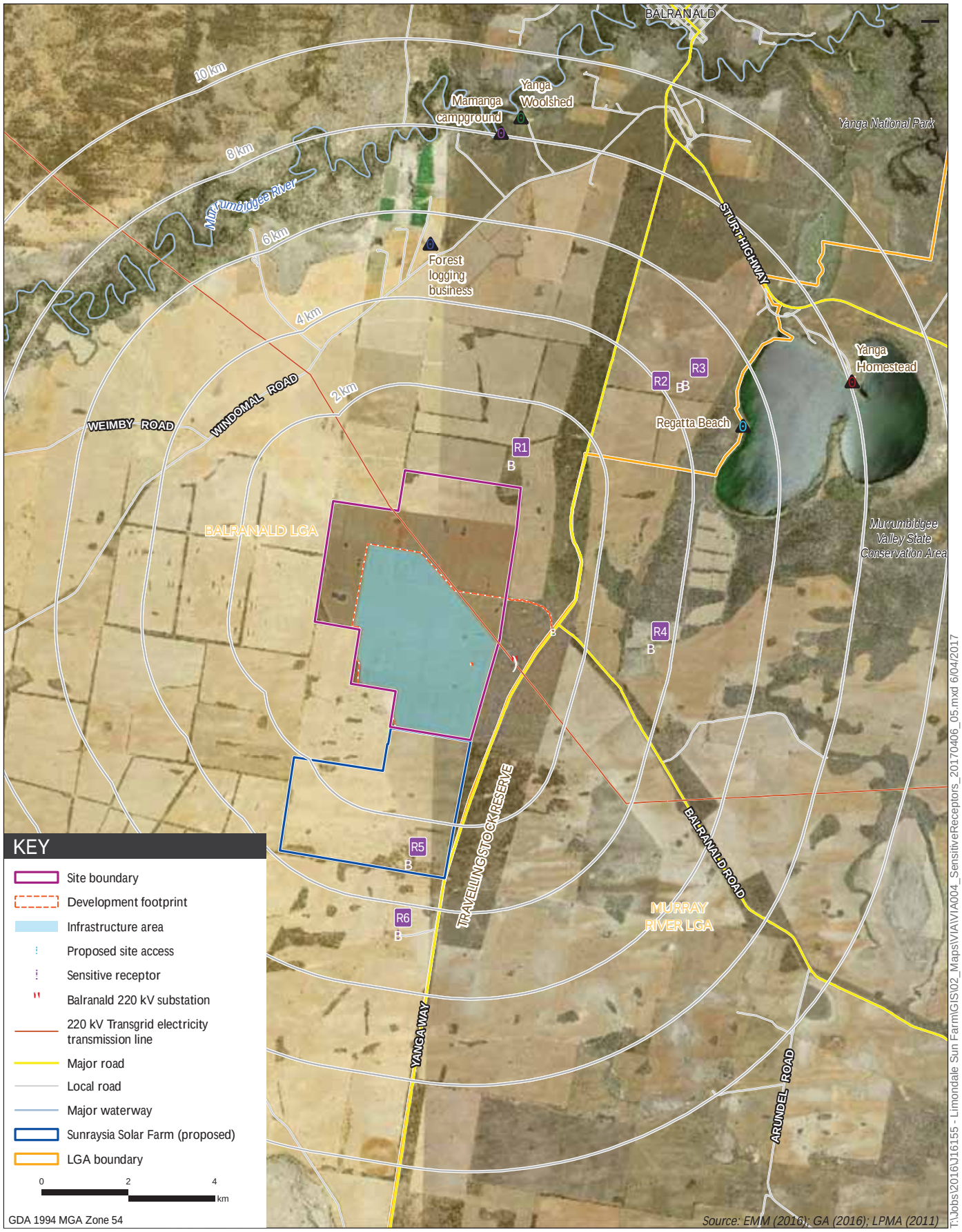
During construction, the landscape within the development footprint will undergo a number of physical changes, namely through the installation of project infrastructure, which will add new features to the visual landscape. Views of the site during construction will be predominantly from motorists travelling along Yanga Way. It is assumed the focus of these motorists will be in line with their direction of travel along Yanga Way. Any changes to the visual landscape during construction are not considered significant due to the presence of screening vegetation within the TSR, the distance between Yanga Way and the site, the low visual sensitivity of passing motorists and the temporary nature of construction activities.

No additional mitigation measures during the site establishment and construction activities are warranted.



Viewpoint locations
Limondale Sun Farm
Visual impact assessment
Figure 5.1

EMM



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EMM

Location of sensitive receptors
Limondale Sun Farm
Visual impact assessment
Figure 5.2

5.3 Operation impacts

An assessment of the selected viewpoints in accordance with the method outlined in Chapter 2 of this report is presented in the following sections.

5.3.1 Viewshed analysis

To determine potential visibility of project infrastructure, a viewshed analysis was completed. The results of the viewshed analysis are presented in Figure 5.3. The viewshed analysis indicates that project infrastructure would be visible from four of the eight viewpoints assessed, Viewpoints 4, 5, 6 and 8.

The viewshed analysis simulates the effects of existing vegetation (based on aerial imagery and ground-truthing) and topography on screening views. A review of aerial imagery indicates that a number of rural residential dwellings surrounding the site feature vegetation screens on their boundaries. These screens would mitigate dust and noise impacts from existing intensive agriculture-related activities on land adjacent to these dwellings, such as, crop harvesting. A key observation made during the site surveys conducted on 31 January 2017 and 1 February 2017 were that the undulating nature of the surrounding landscape and presence of dune crests, as well as stands of both scattered and more dense vegetation between the site and viewpoints, means that views to the site are typically at least partially obstructed from most locations, with the exception of intermittent views of the site from parts of Yanga Way and Windomal Road. The results of the viewshed analysis confirmed these observations (Figure 5.3).

Each of the six sensitive receptors (R1-R6) are shielded from views of the project infrastructure to some degree by vegetation surrounding dwellings, remnant vegetation and/or undulating topography.

During the site surveys, observations made from Regatta Beach, Yanga Homestead, Yanga Woolshed and Mamanga campground confirmed that the undulating nature of the surrounding landscape and stands of both scattered and more dense vegetation between the site and these locations would completely obstruct views of the site and project infrastructure from each of these locations.

KEY

Source: EMM (2017); GA (2016); LPMA (2011)

- Site boundary
- Development footprint
- Infrastructure area
- Proposed site access
- Balranald substation
- 220 kV electricity transmission line
- Major road
- Local road
- Modelled visible areas within the development footprint from viewpoint
- Viewpoint location and direction

0 1 2 km

GDA 1994 MGA Zone 54

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Viewshed analysis within the development footprint from selected viewpoints

Limondale Sun Farm
Visual impact assessment
Figure 5.3

EMM

5.3.2 Viewpoint 1 – Yanga Way south of the site

Table 5.2 Viewpoint 1 – Yanga Way south of the site

Viewpoint details	This viewpoint, shown in Photograph 5.1, is on Yanga Way and is the location of the current access road for the closest private dwelling south of the site (R5 – see Figure 5.2). This location has also been identified as the main entrance for the proposed Sunraysia Solar Farm (refer to Section 3.2). The view direction of Photograph 5.1 is north.
View type and context	The landscape at this location is dominated by undulating, cleared, agricultural land and scattered remnant vegetation of variable height and density. A large dune crest is visible in the landscape north-west of this location. While the Sunraysia Solar Farm has not yet been approved, if developed, this dwelling would have direct views of the Sunraysia Solar Farm, which would be developed between the dwelling and the Limondale Sun Farm.
Visibility baseline assessment	The results of the viewshed analysis indicate that infrastructure in the development footprint will not be visible from this viewpoint.
Magnitude of change	**Negligible** – the extent of the visual landscape affected by project infrastructure at this location will be mitigated by the presence of undulations in the landscape, primarily a crest which is visible in the landscape north-west of this location. Together with scattered remnant vegetation, undulation in the landscape, distance to the site boundary and the low height of the project infrastructure, infrastructure in the development footprint will not be visible from this viewpoint. It is also noted that, if constructed, infrastructure for the proposed Sunraysia Solar Farm will be positioned north-west of this location and south of the site boundary. If constructed, this infrastructure would have the greatest influence on views at this location.
Visual sensitivity	**Moderate** – due to the presence of rural dwellings.
Evaluation of significance	**Slight** – there would not be a significant impact from this viewpoint.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Photograph 5.1 Viewpoint 1 – Yanga Way south of the site

5.3.3 Viewpoint 2 – Yanga Way looking towards the south-eastern corner of the site

Table 5.3 Viewpoint 2 – Yanga Way looking towards the south-eastern corner of the site

Viewpoint details	This viewpoint, shown in Photograph 5.2, is on the western side of Yanga Way and is the location of an existing unsealed track from Yanga Way to the south-eastern corner of the site. The view direction of this photograph is north-west, approximately 500 m south-east of the site.
View type and context	The landscape at this location is dominated by a dense layer of mature vegetation within the TSR, the existing access track, and Yanga Way. Looking towards the site from this location, the existing unsealed access track is also a dominant visual feature in the foreground, with vegetation less dense either side of this track (Photograph 5.3).
Visibility baseline assessment	The results of the viewshed analysis indicate that infrastructure within the development footprint will not be visible from this viewpoint.
Magnitude of change	**Negligible** – the extent of the visual landscape affected by project infrastructure at this location will be mitigated by the presence of a dense layer of mature vegetation within the TSR which traverses the land between Yanga Way and the site's eastern boundary. All views of the project infrastructure from this location will be screened to motorists travelling north along Yanga Way. It is also noted that, if constructed, infrastructure for the proposed Sunraysia Solar Farm may be visible at this location (namely the proposed transmission line to connect the proposed solar farm to the Balranald Substation). If constructed, this infrastructure would have the greatest influence on views at this location.
Visual sensitivity	**Low –** due to the absence of sensitive land use designations (RU1 Primary Production) and status as a Main Road. Further, views at this location will be predominantly from passing motorists.
Evaluation of significance	**Negligible** – there would not be a significant impact from this viewpoint.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Photograph 5.2 Viewpoint 2 – Yanga Way looking towards the south-eastern corner of the site

Photograph 5.3 **Existing unsealed access track linking Yanga Way to the south-eastern corner of the site**

5.3.4 Viewpoint 3 – Yanga Way south of the Balranald Substation

Table 5.4 **Viewpoint 3 – Yanga Way south of the Balranald Substation**

Viewpoint details	This viewpoint, shown in Photograph 5.4, is on the western side of Yanga Way looking north-west. Photograph 5.4 was taken on the road shoulder, approximately 600 m east of the site looking north-west.
View type and context	Views from this location are dominated by stands of remnant vegetation within the TSR. The existing 220 kV transmission line, which connects to the Balranald Substation is visible in the background. Infrastructure at the Balranald Substation is also visible in the background at this location. South of this location, the density of remnant vegetation within the TSR increases (Photograph 5.5). Undulation of the landscape at this location was also observed during the site inspection.
Visibility baseline assessment	The results of the viewshed analysis indicate that infrastructure within the development footprint will not be visible from this viewpoint.
Magnitude of change	**Low** – the extent of the view affected will be limited by the density of remnant vegetation between the road surface edge (ie within the TSR) and the site's eastern boundary, undulation within the landscape, distance to the site and the low height of the project infrastructure. Viewers at this location may have intermittent views of the project infrastructure while driving past. Vegetation within the TSR which provides shielding of views will not be impacted. Project infrastructure will not be the primary view from this viewpoint, as it is assumed the focus of motorists will be in line with their direction of travel along Yanga Way. It is also noted that, if constructed, infrastructure for the proposed Sunraysia Solar Farm may be visible at this location (namely the proposed transmission line to connect the proposed solar farm to the Balranald Substation). If constructed, this infrastructure would become an additional visual feature in the landscape at this location.

Table 5.4 Viewpoint 3 – Yanga Way south of the Balranald Substation

Visual sensitivity	**Low –** due to the absence of sensitive land use designations at this location (RU1 Primary Production) and status as a Main Road. Further, views at this location will be predominantly from passing motorists.
Evaluation of significance	**Slight** – there would not be a significant impact from this viewpoint.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Photograph 5.4 Viewpoint 3 – Yanga Way south of the Balranald Substation

Photograph 5.5 Example of the density of remnant vegetation within the TSR (600 m south of Viewpoint 3)

5.3.5 Viewpoint 4 – Yanga Way north of the Balranald Substation

Table 5.5 Viewpoint 4 – Yanga Way north of the Balranald Substation

Viewpoint details	This viewpoint, shown in Photograph 5.6, is on the western side of Yanga Way looking west. Photograph 5.6 was taken on the road shoulder, approximately 900 m east of the site boundary. Photograph 5.7 was taken from the same location looking north-west. Photograph 5.8 was taken from the same location looking south-west.
View type and context	Views from this location are dominated by scattered layers of remnant vegetation within the TSR. The existing 220 kV transmission line, which connects to the Balranald Substation, is visible in the background (Photograph 5.6 and Photograph 5.7). The existing 220 kV transmission line crosses Yanga Way south of this location (Photograph 5.8). Other infrastructure connecting to the Balranald Substation, namely overhead wiring and poles, is also visible in the background at this location (Photograph 5.6 and Photograph 5.7). Undulation of the landscape at this location was also observed during the site inspection.
Visibility baseline assessment	The results of the viewshed analysis indicate that parts of the development footprint will be visible from this viewpoint (Figure 5.3).
Magnitude of change	**Low** – the extent of the view affected will be limited by the density of remnant vegetation between the TSR and the site's eastern boundary, undulation within the landscape, distance to the site and the low height of the project infrastructure. Viewers at this location may have intermittent views of the project infrastructure while driving past. Vegetation within the TSR which provides shielding of views will not be impacted. Project infrastructure will not be the primary view from this viewpoint, as it is assumed the focus of motorists will be in line with their direction of travel along Yanga Way.
Visual sensitivity	**Low –** due to the absence of sensitive land use designations at this location (RU1 Primary Production) and status as a Main Road. Further, views at this location will be predominantly from passing motorists.
Evaluation of significance	**Slight** – there would not be a significant impact from this viewpoint. Visual impacts from this viewpoint will continue throughout the life of the project.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Photograph 5.6 Viewpoint 4 – Yanga Way north of the Balranald Substation looking west

Photograph 5.7 Yanga Way north of the Balranald Substation looking north-west

Photograph 5.8 Yanga Way north of the Balranald Substation looking south-west

5.3.6 Viewpoint 5 – Close to the intersection of Yanga Way and Balranald Road

Table 5.6 Viewpoint 5 – Close to the intersection of Yanga Way and Balranald Road

Viewpoint details	This viewpoint, shown in Photograph 5.9, is on the western side of Yanga Way looking west. Photograph 5.9 was taken on the road shoulder, approximately 1.3 km east of the site boundary. The view direction of this photograph is west. Photograph 5.11 was taken from the southern road shoulder of Balranald Road looking south-west and is representative of a vehicle approaching the intersection of Balranald Road and Yanga Way looking south-west down Yanga Way. Photograph 5.12 was taken from the eastern road shoulder of Yanga Way looking south-west and is representative of a vehicle entering Yanga Way after turning left out of Balranald Road.
View type and context	Remnant vegetation within the TSR at this location is less dense than in surrounding areas and the landscape at this location is relatively flat. Infrastructure associated with the Balranald Substation, namely overhead wiring and poles, is visible in the foreground at this location (Photograph 5.9). The existing 220 kV transmission line, which connects to the Balranald Substation, is visible in the background (Photograph 5.9).

Table 5.6 Viewpoint 5 – Close to the intersection of Yanga Way and Balranald Road

Visibility baseline assessment	The results of the viewshed analysis indicate that parts of the development footprint will be visible from this viewpoint (Figure 5.3). As part of this VIA, Viewpoint 5 was selected for preparation of a photomontage. Photomontages enable potential visual changes from a viewpoint to be illustrated on a photograph, with the objective of simulating the visual extent of project infrastructure, once constructed. Viewpoint 5 was selected as it is representative of viewers on both Yanga Way and Balranald Road, and project infrastructure is predicted to be visible based on the results of the viewshed analysis (Figure 5.3). The existing view from Viewpoint 5 is shown in Photograph 5.9 and the photomontage is shown in Photograph 5.10. The photomontage conservatively assumes the height of the project infrastructure will be 3 m, which is more than double the average height of the dominant project infrastructure, namely the PV solar panels (refer to Section 4.4). Consequently, it is assumed that the actual visible extent of project infrastructure from Viewpoint 5 will be significantly less than the area highlighted in white shading in Photograph 5.10.
Magnitude of change	**Moderate** – the extent of the visual landscape affected by project infrastructure will be mitigated by the presence of existing vegetation within the TSR, although project infrastructure will likely be visible intermittently through gaps in vegetation (refer to Photograph 5.10). The degree of shielding from vegetation will increase in some areas where vegetation within the TSR is more dense. At its closest point, this viewpoint is approximately 1.5 km from the development footprint. Though it may be visible intermittently, given the low height of the project infrastructure and distance from this viewpoint, the project infrastructure will not be a prominent visual feature in the landscape (refer to Photograph 5.10). Vegetation within the TSR which provides shielding of views will not be impacted. Views at this location are from motorists: i) travelling south along Yanga Way at 100 km/hr; ii) approaching the intersection of Balranald Road and Yanga Way (Photograph 5.11); and iii) commencing travel south along Yanga Way after turning left out of Balranald Road (Photograph 5.12). Project infrastructure will not be the primary view from this viewpoint, as it is assumed the focus of motorists will be in line with their direction of travel along Yanga Way. The focus of motorists approaching and sitting stationary at the intersection of Balranald Road and Yanga Way is assumed to be in line with their direction of travel, as well as the large chevron sign and other traffic signage, which is a prominent visual feature in the foreground at the intersection location.
Visual sensitivity	**Low** – due to the absence of sensitive land use designations at this location (RU1 Primary Production) and status as a Main Road. Further, views at this location will be predominantly from passing and/or momentarily stationary motorists.
Evaluation of significance	**Slight/moderate** – there would not be a significant impact from this viewpoint. Visual impacts from this viewpoint will continue throughout the life of the project.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Photograph 5.9 **Viewpoint 5 – Close to the intersection of Yanga Way and Balranald Road**

Photograph 5.10 **Viewpoint 5 – Potential visible extent of project infrastructure**

Photograph 5.11 Representative view of a motorist approaching the intersection of Yanga Way and Balranald Road looking south-west

Photograph 5.12 Representative view of a motorist entering Yanga Way after turning left out of Balranald Road, looking south

5.3.7 Viewpoint 6 – Yanga Way north of the development footprint

Table 5.7 Viewpoint 6 – Yanga Way north of the development footprint

Viewpoint details	This viewpoint, shown in Photograph 5.13, is on the western side of Yanga Way looking south-west. Photograph 5.13 was taken on the road shoulder, approximately 1.3 km east of the site boundary.
View type and context	Views from this location are dominated by scattered layers of remnant vegetation within the TSR. However, as illustrated in Photograph 5.13, the vegetation within the TSR generally becomes significantly less dense when looking in a more westerly direction from this location. Additional infrastructure associated with the Balranald Substation, namely overhead wiring and poles, is also visible in the foreground at this location (Photograph 5.13). The existing 220 kV transmission line, which connects to the Balranald Substation, is visible in the background (Photograph 5.13).
Visibility baseline assessment	The results of the viewshed analysis indicate that parts of the development footprint will be visible from this viewpoint (Figure 5.3).
Magnitude of change	**Moderate** – the extent of the view affected will be limited by the density of remnant vegetation within the TSR, distance to the development footprint (approximately 3 km at its closest point), and the low height of the project infrastructure (typically up to 2 m). Though visible momentarily for passing motorists, project infrastructure will not be a prominent visual feature in the landscape at this location. Vegetation within the TSR which provides shielding of views will not be impacted. Project infrastructure will not be the primary view from this viewpoint, as it is assumed the focus of motorists will be in line with their direction of travel along Yanga Way.
Visual sensitivity	**Low –** due to the absence of sensitive land use designations at this location (RU1 Primary Production) and status as a Main Road. Further, views at this location will be predominantly from passing motorists.
Evaluation of significance	**Slight** – there would not be a significant impact from this viewpoint.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Photograph 5.13 Viewpoint 6 – Yanga Way north of the development footprint

5.3.8 Viewpoint 7 – Windomal Road north of the existing transmission line

Table 5.8 Viewpoint 7 – Windomal Road north of the existing transmission line

Viewpoint details	This viewpoint, shown in Photograph 5.14, is on the eastern side of Windomal Road looking south. Photograph 5.14 was taken on the road shoulder, approximately 5.3 km north of the site boundary.
View type and context	Views from this location represent a typical rural setting with a predominantly flat expanse of cleared, agricultural land. A large dune crest is visible in the landscape south of this location.
Visibility baseline assessment	The results of the viewshed analysis indicate that the development footprint will not be visible from this viewpoint.
Magnitude of change	**Negligible** - the extent of the visual landscape affected by project infrastructure at this location will be mitigated by the presence of a large dune crest, which is visible in the landscape south of this location. Together with scattered remnant vegetation, undulation in the landscape, distance to the site boundary and the low height of the project infrastructure, all views of the project infrastructure from this location will be screened. In addition, seasonal variability in cropping and crop height on the agricultural land between the site and this location will further reduce any potential for views of the project infrastructure from this location.
Visual sensitivity	**High** – due to the location of this viewpoint within a sensitive land use designation (ie E1 National Parks and Nature Reserves) and the presence of rural dwellings (two private dwellings outside of the 5 km radius considered as part of this visual assessment). However, views at this location will be predominantly from motorists travelling on Windomal Road. It is assumed the focus of motorists will be in line with their direction of travel along Windomal Road.
Evaluation of significance	**Slight** – there would not be a significant impact from this viewpoint.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Photograph 5.14 Viewpoint 7 – Windomal Road north of the existing transmission line

5.3.9 Viewpoint 8 – Windomal Road south of the existing transmission line

Table 5.9 Viewpoint 8 – Windomal Road south of the existing transmission line

Viewpoint details	This viewpoint, shown in Photograph 5.15, is on the eastern side of Windomal Road looking south. Photograph 5.15 was taken on the road shoulder, approximately 3 km north-west of the site boundary. The view direction of this photograph is south-east.
View type and context	Views from this location represent a typical rural setting with a predominantly flat expanse of cleared, agricultural land. Existing, unsealed access tracks and scattered patches of remnant vegetation are also prominent visual features apparent at this location. The existing 220 kV transmission line, which connects to the Balranald Substation, is visible in the background (Photograph 5.15).
Visibility baseline assessment	The results of the viewshed analysis indicate that parts of the development footprint will be visible from this viewpoint (Figure 5.3).
Magnitude of change	**Low** - the extent of the visual landscape affected by project infrastructure at this location will be mitigated by scattered remnant vegetation, undulation in the landscape, distance to the site boundary and the low height of the project infrastructure. At its closest point, project infrastructure will be positioned approximately 4.2 km south-east of this location. All views of the project infrastructure from this location will be imperceptible and, if visible, project infrastructure will not be a prominent visual feature in the landscape. In addition, seasonal variability in cropping and crop height on the agricultural land between the site and this location will further reduce any potential views of the project infrastructure from this location.
Visual sensitivity	**Low –** due to its agricultural landscape character, absence of sensitive land use designations (RU1 Primary Production) and status as an unclassified road. Views at this location will be from motorists travelling on Windomal Road. It is assumed the focus of motorists will be in line with their direction of travel along Windomal Road rather than on project infrastructure.
Evaluation of significance	**Slight** – there would not be a significant impact from this viewpoint.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Photograph 5.15 Viewpoint 8 – Windomal Road south of the existing transmission line

5.4 Reflectivity and glare

A number of different sources indicate that, in general, as little as 2% of the light received is reflected by PV solar panels (NSW DoI DRE 2016; Solar Trade Association 2016; FAA 2010). As noted by both the Federal Aviation Administration of the United States (FAA 2010) and Spaven Consulting (2011), this degree of reflectivity is less than the reflectivity produced by a wide variety of different surfaces, including surfaces within the immediate vicinity of the project's development footprint, such as bare soil and vegetation, and is similar to the reflectivity of smooth bodies of water.

The potential impacts of reflectivity on sensitive receptors, primarily motorists travelling along Yanga Way, are glint and glare. Glint refers to shorter period and more intense levels of exposure, while glare refers to sustained or continuous periods of exposure to excessive brightness, but at a reduced level of intensity (Morelli 2014). The amount of glint and glare produced by a PV solar panel is variable and is dependent on the angle of the panels, with lower angles producing less glint and glare (Morelli 2014). As described above, the project's PV solar panels will be constructed in a single axis tracking configuration. This configuration will allow the PV solar panels to rotate from east to west during the day tracking the sun's movement. Consequently, the degree of glint and glare experienced by sensitive receptors will be variable depending on the time of day and viewing location.

Spaven Consulting (2011) prepared a report to assess the potential impact of solar photovoltaic energy facilities located in off-airfield situations. Within this report, the potential for glare to pilots caused by sunlight reflected by PV solar panels was identified as the only significant aviation issue likely to be raised by PV solar energy facilities (Spaven Consulting 2011). As noted within this report, PV solar energy facilities positioned away from airports and airfields are unlikely to present problems to pilots, with the only potential hazards likely to be encountered during the critical phases of flight, namely approach and landing (Spaven Consulting 2011). The report also concluded that there was no evidence at the time of publication of glare from any existing PV solar energy facilities affecting pilots and no cases of accidents in which glare caused by a PV solar energy facility was cited as a factor (Spaven Consulting 2011).

As noted in Section 3.5, the Balranald Airport is approximately 16 km north of the site (Figure 3.1). The Balranald Airport runway is positioned in an approximate north-south orientation.

Due to the distance between the Balranald Airport and the site, it is unlikely that aircraft using this facility will pass directly over the site during the critical phases of flight as identified in the report produced by Spaven Consulting (2011). OVERLAND consulted with the Civil Aviation Safety Authority (CASA) during the preparation of this VIA to discuss the potential impact of the project on flights to and from the Balranald Airport. As part of this consultation, CASA confirmed that it is unlikely that the project infrastructure will impact pilot's sight during the critical phases of flight. Further, CASA did not consider the project to be a hazard to aviation. During consultation, CASA recommended that an anti-glare coating be applied to the PV solar panels to minimise any potential residual glare. As noted in Section 4.4, the panel designs considered for the project, feature anti-reflective surface treatment.

A scoping exercise was conducted by Solar Trade Association (2016) to help inform debates around development proposals for non-domestic solar PV developments in Scotland. The exercise identified a variety of examples of airports successfully operating with large installations of PV solar panels on airport-related infrastructure, adjacent to airport runways and/or under direct flight paths (Solar Trade Association 2016). REC PV solar panels are currently in use at the Giebelstadt Power Plant in Germany, which features 120,000 PV solar panels with a total capacity of 28 MW. This project is located adjacent to an airport currently used for general aviation purposes. Within the United States, four separate arrays of PV solar panels envelop the Denver International Airport, with a combined capacity of approximately 10 MW.

Within Australia, Adelaide Airport's Terminal One roof supports 760 PV solar panels with a capacity of 114 kW and Darwin Airport features a 4 MW solar farm, which includes 15,000 PV solar panels over 6 ha. In addition, the Ballarat Solar Park, which has an installed capacity of 300 kW, is positioned adjacent to the boundary of the Ballarat Airport.

The potential for low angled reflected sunlight to cause a distraction to drivers travelling either north or south along Yanga Way, or west along Balranald Road were considered as part of the traffic impact assessment for the project (Appendix H of the EIS). Vegetation screening was not considered to be necessary, given the offset distances of over 500 m to the nearest PV solar panel from vehicles travelling along Yanga Way, and the significant vegetation screen, which is already provided by the TSR that extends along the western side of Yanga Way (Figure 3.1).

Based on the findings of previous assessments prepared for PV solar energy facilities, glint and glare from the project's PV solar panels are not expected to significantly impact the following:

- sensitive receptors within the vicinity of the site;
- people engaged in agricultural activities in the surrounding landscape;
- motorists travelling along the major road corridor of Yanga Way;
- motorists travelling along the local road corridor of Windomal Road;
- motorists travelling along a number of minor unsealed rural property access roads and farm tracks; and
- aircraft arriving at or departing from the Balranald Airport.

5.5 Community perceptions of large-scale solar developments

Both Ipsos (2015) and NSW Office of Environment and Heritage (OEH) (2015) have conducted separate investigations in to the acceptability of large scale solar facilities in Australia and NSW, respectively. Ipsos (2015) noted that, in contrast to wind farms, large scale PV solar facilities do not trigger strong reactions from neighbouring members of the community. In a survey of approximately 1,200 Australians, a slightly higher proportion of participants agreed that large scale solar facilities have a negative visual impact on the local landscape when compared with participants who disagreed (Ipsos 2015). However, a higher proportion neither agreed nor disagreed, which indicates a lack of knowledge about the potential visual impact of such facilities.

As part of an investigation in to community attitudes to renewable energy, OEH surveyed 2,000 adults from across NSW, with the majority of survey participants supporting the use of solar farms (OEH 2015). Of the small proportion of participants who opposed solar farms being located near their place of residence, visual impacts were one of the key concerns raised. This finding provides further evidence of the need for effective community consultation to ensure that surrounding landholders are adequately informed of the impact of the project on the surrounding landscape.

Community consultation as part of the project has focused on informing surrounding landholders of the development footprint and the likely visual impact of the project infrastructure on the local landscape. This has included the provision of images of PV solar panels, inverters and other associated infrastructure. To assist with their interpretations of the scale of the project, the development footprint has been converted using easy-to-visualise descriptors, such as football fields, during community consultation activities.

As noted previously, OVERLAND engaged with the owners of the closest sensitive receptor, R1, to discuss the potential visibility of the project infrastructure from this receptor, which confirmed that the landholder did not have concerns regarding visual changes to the landscape.

5.6 Summary of visual assessment

A summary of the results of the analysis of visual impacts for each of the eight viewpoints is provided in Table 5.11.

Table 5.10 Summary of results of visual impacts at each viewpoint

Viewpoint	Distance to site	Project infrastructure visible based on viewshed analysis	Magnitude of change	Visual sensitivity	Evaluation of significance	Significant impact?	Additional mitigation required?
Viewpoint 1	3 km	No	Negligible	Moderate	Slight	No	No
Viewpoint 2	0.5 km	No	Negligible	Low	Negligible	No	No
Viewpoint 3	0.6 km	No	Low	Low	Slight	No	No
Viewpoint 4	0.9 km	Yes	Low	Low	Slight	No	No
Viewpoint 5	1.3 km	Yes	Moderate	Low	Slight/moderate	No	No
Viewpoint 6	1.3 km	Yes	Moderate	Low	Slight/moderate	No	No
Viewpoint 7	5.3 km	No	Negligible	High	Slight	No	No
Viewpoint 8	3 km	Yes	Low	Low	Slight	No	No

The results of this VIA indicate that the project will have a negligible visual impact on surrounding sensitive receptors. Subsequently, a draft landscaping plan for on-site perimeter planting has not been prepared and is not considered necessary.

6 Conclusion

A visual assessment has been conducted from a number of representative viewpoints surrounding the site and the project's development footprint. The viewpoints were selected to represent views close to private residential properties and road corridors (ie Yanga Way and Windomal Road) nearest to the site and the project's development footprint.

Eight viewpoints have been assessed to demonstrate the visual impacts of the project. Due to existing mature vegetation, variable elevation and undulation in the landscape, and the relatively low height of the dominant project infrastructure, namely the PV solar panels, the project's infrastructure will be relatively shielded from view at the majority of the viewpoints assessed as part of this visual assessment.

The project design, development footprint and placement of infrastructure have progressively evolved to minimise or avoid visual impacts. Nonetheless, the development of the project will result in some changes to the landscape. Visual impacts will commence during the construction stage and continue throughout the duration of the operation stage of the project. Such changes will be noticeable to viewers and will generally be perceived as intruding into a rural landscape from certain viewpoints surrounding the site.

However, in most instances, vegetation and topography, combined with the relatively low height of the project's infrastructure and distance means that visual impacts will be minimised. Given the minimal visual impact of the project, a draft landscaping plan for on-site perimeter planting is not considered necessary.

This visual assessment concludes that the project will not have any significant adverse visual impacts on the locality.

Abbreviations

Balranald LEP	Balranald Local Environmental Plan 2010
CASA	Civil Aviation Safety Authority
DA	development application
DP&E	NSW Department of Planning and Environment
EIS	environmental impact statement
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
GLVIA	Guidelines for Landscape and Visual Impact Assessment
goFARM	goFARM Australia Pty Ltd
IBRA	Interim Biogeographic Regionalisation for Australia
km	kilometres
kV	kilovolt
LEP	local environmental plan
LGA	local government area
mm	millimetre
MW	megawatt
OEH	NSW Office of Environment and Heritage
OVERLAND	OVERLAND Sun Farming Pty Ltd
PV	photovoltaic
RMS	NSW Roads and Maritime Services
SEARs	Secretary's Environmental Assessment Requirements
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SSD	State significant development
TSR	travelling stock reserve
VA Bulletin	Wind Energy: Visual Assessment Bulletin AB 01 For State significant wind energy development

VIA	Visual Impact Assessment
Wakool LEP	Wakool Local Environmental Plan 2013

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