Appendix H

Visual Impact Assessment and Landscape Plan

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MARYVALE SOLAR FARM

VISUAL IMPACT ASSESSMENT

Prepared for Pitt & Sherry

CAMBIUM GROUP

PROPOSED MARYVALE SOLAR PHOTOVOLTAIC (PV) FARM
VISUAL IMPACT ASSESSMENT

DATE: 6 September 2018
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DOCUMENT CONTROL

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01	13 July 2018	Draft for review	A. Dodds	S. Brodbeck
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1 Introduction

1.1 Purpose of this report

This report has been prepared to assess visual impacts associated with a proposed solar photovoltaic (PV) farm at Maryvale, NSW (the 'Proposal'). The report has been prepared for the Proponent, Photon Energy, and addresses the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning and Environment (DPE) regarding 'visual' issues potentially associated with the Proposal.

The relevant SEARs state:

> *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.*

The requirements of the SEARs, and the relevant sections of this report where these requirements are met are identified in **TABLE 1-1.**

TABLE 1-1: SEARS VISUAL REQUIREMENTS

Visual Requirement	Where addressed in this report
…an assessment of the likely visual impacts of the development…	Whole of report.
…(including any glare, reflectivity and night lighting)…	Key visual concerns of solar farms such as glare and reflectivity are considered in **SECTION 5.** Night lighting is discussed at **SECTION 4.**
…surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain…	**SECTION 6** - likely effects to landscape character. **SECTION 7** - likely affects to surrounding key viewpoints, including public viewpoints and from surrounding rural residences.
…a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners	**SECTION 10.3** – A Concept Landscape Plan for on-site perimeter planting developed in consultation with affected landowners.

1.2 Brief project description

Photon Energy propose to construct and operate a 125 megawatt (MW) solar PV farm at Maryvale, a rural area approximately 15 kilometres (km) north of Wellington, NSW, in the Dubbo Regional Council Local Government Area (LGA).

The solar PV farm is proposed at two adjoining rural properties:

- "Waroona", 121 Maryvale Road, Maryvale and
- "Scarborough House", 801 Cobbora Road, Maryvale.

The proposed solar farm would occupy approximately 375 hectares (ha).

The land to be occupied by the solar farm would be leased by the Photon Energy. The remaining land would continue to be used for agricultural purposes.

The location of the proposed solar farm is shown in **FIGURE 1-1**. A description of the site is provided in **SECTION 3** and a detailed description of the proposed solar farm and its components is provided in **SECTION 4.**

1.3 Report format

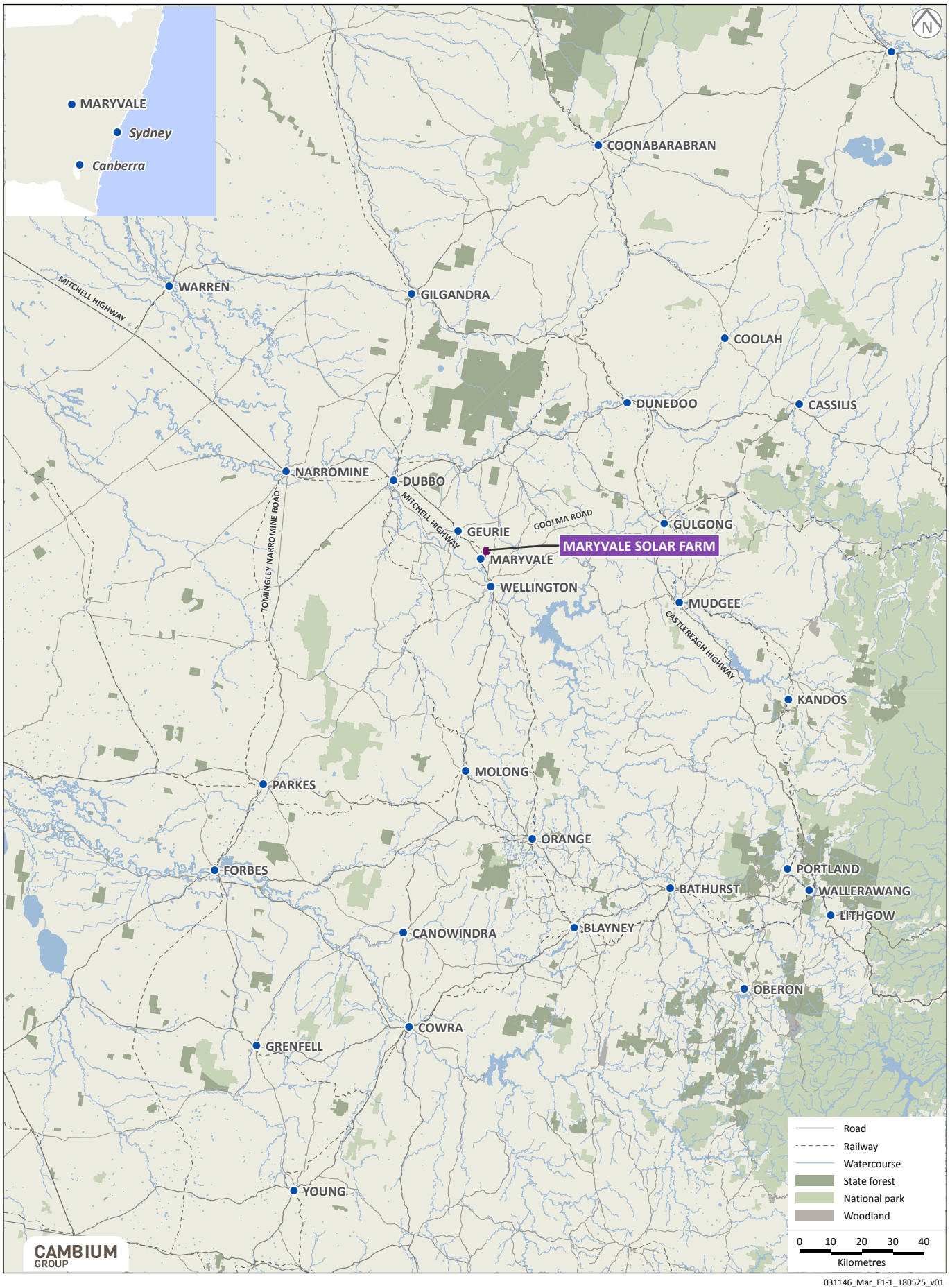
The report is set-out in the following format:

SECTION 2	Outlines the methodology for the assessment
SECTION 3	Establishes baseline conditions and describe the Site context
SECTION 4	Describes the main visual changes associated with the Proposal
SECTION 5	Discusses key visual concerns of solar farms
SECTION 6	Assesses the likely effects to landscape character
SECTION 7	Assesses the likely affects to surrounding key viewpoints
SECTION 8	Presents photomontages from the key viewpoints
SECTION 9	Presents mitigation measures including a concept landscape plan
SECTION 10	Conclusion.

FIGURE 1-1

Site location

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT



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2 Assessment methodology

This section of the report defines the methodology for the assessment. The assessment methodology has been based on the relevant state government guideline (i.e. the Draft Large Scale Solar Energy Guideline), professional experience with other large-scale infrastructure projects, and visual assessment guidelines used by government authorities in Australia and internationally.

2.1 Methodology Framework

The *Draft Large Scale Solar Energy Guideline* (New South Wales (NSW) Department of Planning (DPE), 2017) provides the community, industry, applicants and regulators with guidance on the planning framework for the assessment and approval of large scale solar energy development proposals under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), which are classified as 'State significant development' (SSD).

The Guideline identifies the key planning and strategic considerations relevant to solar energy SSD in NSW. It aims to assist in the site selection and design of proposals and it will be used by the DPE to assist in the assessment of relevant development applications. It is intended as a general guideline only.

Under the Guideline, visual impact considerations are most relevant in the section on 'site selection', where it states that:

> *'sites with characteristics that may assist in minimising localised impacts such as:*
>
> - *land that does not contain native vegetation or has previously been cleared and utilised for industrial - type purposes (brown - field sites) in rural settings,*
> - *unobtrusive sites with flat, low - lying topography, and*
> - *sites with potential to be screened, such as those that can be readily vegetated along boundaries, to reduce visual impacts'*.

Additionally, under the heading of 'Site Constraints' (where this heading is further defined as meaning that 'while the following types of land or sites are not precluded from large-scale solar energy development, they do indicate areas of constraint that should be identified as part of the constraints mapping'), the following relevant component is identified:

> *'sites with high visibility, such as those on prominent or high ground positions, or sites which are located in a valley with residences with elevated views looking toward the site' (NB: a footnote further defines this to mean: 'high visibility or prominence is of particular concern if the solar infrastructure at the site would be juxtaposed against significant scenic, historic or cultural landscape'.)*

Under 'Key Assessment Issues' the Guideline refers to the consideration of visual impacts as follows:

Visual impacts: the acceptability of impacts on landscape character and values, the amenity of landholders and communities, and the adequacy of the measures which are proposed to avoid, reduce or otherwise manage these impacts.

The visual impact of solar energy development will depend on the scale and type infrastructure, the prominence and topography of the site relative to the surrounding environment, and any proposed measures to screen or otherwise reduce visibility of the site. Solar thermal projects may have greater offsite visibility due to the presence of tower infrastructure. Greater off - site visibility of the site will increase the chances of impacts such as glint, glare, reductions in visual amenity, and detraction from the surrounding landscape character including natural, scenic, historic or cultural landscapes. There may also be road safety impacts from glint and glare.

The most relevant parts of the Guidelines relating to visual impacts have been addressed as part of this report. The findings are presented in the conclusion at **TABLE 12-1.**

2.2 Applied Methodology

The applied methodology used in this report has been based on professional experience with other large-scale infrastructure projects, and visual assessment guidelines used by government authorities in Australia and internationally, including:

- '*Environmental Impact Assessment Guidance Note – Guidelines for Landscape Character and Visual Impact Assessment*', 2013, NSW Roads and Maritime Services
- '*Visual Landscape Planning in Western Australia*', 2007, Western Australian Planning Commission
- the United Kingdom's widely used '*Guidelines for Landscape and Visual Impact Assessment,*' 2013, the Landscape Institute and Institute of Environmental Management and Assessment.
- '*Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands*', 2013, United States Department of the Interior.

The below guideline on reviewing visual assessments has also informed the methodology:

- '*Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects*', 2014, Sullivan and Meyer, for United States Department of the Interior.

The methodology has been tailored to address the particular visual impacts of establishing this type and scale of infrastructure in this location.

2.3 Potential visibility

An initial step in the assessment was to identify potentially-sensitive viewing locations such as residences, and publicly accessible areas such as towns and local roads. These locations were initially determined by establishing the potential geographic extent of the viewing area using desktop analysis of aerial photography and elevation.

2.4 Site assessment

An initial site inspection was held 23 November 2017 and a further inspection undertaken 21 June 2018[1]. The Proposal was considered in the context of the Site setting. Landscape character within the locality is described at **SECTION 3.**

The potentially sensitive viewing locations previously identified by desktop analysis were verified[2] during the site inspection. Viewpoints were modified or confirmed based on site findings (such as the screening effects of vegetation).

Access to private properties was not possible during the site inspection. Visibility was assessed from the closest public access to each viewpoint and desktop analysis. The assessment viewpoints are identified in **SECTION 7.**

Due to the large number of potential viewers, and the relatively similar visual experience from some locations, some viewpoints were grouped. Groups (or clusters of viewpoints) were determined based on:

- 1. distance from the Proposal;
- 2. elevation comparative to the Proposal; and
- 3. proportion of the site potentially seen.

Viewpoints were then selected for photomontage images. Where possible, the locations selected have the 'worst case' (most prominent) view of the Proposal. However, viewpoints have also been selected that are representative of the variety of locations with views of the Proposal.

2.5 Assessment criteria

Two main types of visual impacts are assessed in this report:

1. Effect on the landscape character – the overall impact of a project on an area's character and sense of place.
2. Effect on key viewpoints – the day to day visual effects of a project on people's views.

The level of impact to landscape character and viewpoints is based on the combination of two criteria – 'sensitivity' and 'magnitude of change', defined by Roads and Maritime (2013) as:

[1] Additional photographs were taken 13 February 2018.

[2] Desktop analysis does not take into account site features such as vegetation and built elements which may obstruct views.

- Sensitivity - The sensitivity of a landscape character zone or view and its capacity to absorb change. In the case of visual impact this also relates to the type of viewer and number of viewers.
- 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.

For the purposes of this assessment, the specific criteria used to determine sensitivity and magnitude of change (both for landscape character and visual impact to viewpoints) are listed in **TABLE 2-1** and **TABLE 2-2**. These criteria have been defined for this Proposal and take into account the particular characteristics of the solar farm Proposal, such as its low height.

2.5.1 Sensitivity criteria

Understanding the characteristics of those who would likely view the Proposal is important because it is the human response to visible changes in a landscape that determines whether the changes represent an improvement in scenic attractiveness (a positive visual impact) or a decrease in scenic attractiveness (a negative visual impact)[3].

The following sensitivity criteria have been considered in this assessment[4]:

- The type of viewer that sees from a particular viewpoint (private or public, stationary or moving and their engagement in the view) (Refer also side bar "public vs private viewpoints")
- Viewer distance from the Proposal (clarity is reduced as distance increases)[5]
- Numbers of people viewing from the viewpoint
- Expected duration of views
- Particular sensitivities of the viewers.

These criteria have been used as a guide to determine high, moderate, low or negligible sensitivity ranking, as shown in **TABLE 2-1**.

Public vs Private viewpoints

Visual perceptions of renewable energy equipment dominate public acceptability but differ between visitors and residents*.

When assessing private viewpoints, such as residences, the closer the proximity and clearer the potential view, generally the greater sensitivity to change, and therefore the higher potential for visual impact. However, although a high impact may be experienced by an individual residence, or group of residences, the overall level of impact needs to take into account the number of residents affected, plus how significant that impact may be in terms of the wider community.

* Apostol, D. 2017. *The Renewable Energy Landscape*. Routledge, 20160819. (Apostol 108)

[3] Sullivan, R. and M Meyer. 2014. p22

[4] Adapted from:

- Apostol, D. 2017. *The Renewable Energy Landscape*; Sullivan, R. and M Meyer. 2014. p43; and
- United States Department of the Interior. 2013. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands.

[5] Regions with sunnier skies and dryer air will, on average, experience higher levels of visual contrast and longer visibility distances for renewable energy facilities than will regions with less sunny skies and higher humidity levels. United States Department of the Interior. 2013

TABLE 2-1: SENSITIVITY RANKING CRITERIA

Sensitivity	Criteria (general guide only, some or all may apply)
High	▪ Landscape or cultural heritage of high to very high conservation value ▪ Landscape with characteristics that are highly sensitive and highly affected by large-scale development ▪ Public views with a high to very high number of users and/or in close proximity and with potential for longer duration ▪ Private views in close proximity (generally less than 1km) with mostly unimpeded views
Moderate	▪ Landscape or cultural heritage of moderate conservation value ▪ Landscape with characteristics moderately affected by large-scale development ▪ Public views with a moderate to high number of viewers and/or viewers are in close or moderate proximity (generally less than 2.5km away) ▪ Private views in moderate proximity (generally 1-2.5km) with some views, or a further distance (2.5-5km) with mostly unimpeded views
Low	▪ Some landscape or cultural heritage conservation value but of lower visual value ▪ Landscape characteristics not greatly affected by large-scale development ▪ Public views for a small number of users and/or viewers more distant (generally over 2.5km away) and/or generally of short duration ▪ Private views in more distant proximity (generally 5km+) with some unimpeded views
Negligible	▪ Landscape has no or very little cultural heritage, conservation or visual value ▪ Characteristics relatively unaffected by large-scale development ▪ Very few people can view ▪ Viewers are a long distance from site (generally over 5km with no obvious views) ▪ Private views generally not affected.

2.5.2 Magnitude of change criteria

The following magnitude criteria have been considered when determining magnitude of change:

- The characteristics of the proposal (its size, scale relative to other objects in view)

- Visual prominence (how dominant, or the focal point of the view is the proposal)
- Viewer position in relation to the proposal (elevation and angle of viewpoint, relationship to sun angle)
- Extent (proportion of the proposal that would be seen)
- Compatibility with surrounding landscape (the contrasts of the proposal in scale and character (either existing or planned) and effect on scenic quality
- Whether the change would be temporary or permanent

These criteria have been used as a guide to determine high, moderate, low or negligible magnitude taking into account the general visual features (scale, bulk and height) of the proposal, as shown in **TABLE 2-2.**

TABLE 2-2: MAGNITUDE OF CHANGE RANKING CRITERIA

Magnitude	Criteria (general guide only, some or all may apply)
High	▪ Significant scale (bulk and height) and extent of area affected ▪ Permanent and irreversible change ▪ The site has a high visual prominence (is a key feature of the view) ▪ The viewer position in relation to the proposal is substantially elevated and from a northern, eastern or western location ▪ The viewer sees a large proportion of the facility (typically more than half (50%)) ▪ The proposal forms a significant and immediately apparent part of the scene, and one that significantly contrasts in scale and character (either existing or planned) and is severely detrimental to the quality of the scene.
Moderate	▪ Moderate scale (bulk and height) and extent of area affected ▪ The site is visually prominent (a recognisable feature of the view) ▪ The viewer position in relation to the proposal is elevated ▪ The viewer sees a moderate proportion of the facility (typically a quarter to a half (25-50%)) ▪ Temporary, or if permanent, effects which may reduce over time ▪ The proposal becomes a noticeably dominant feature of the scene, and one that contrasts in scale and character (either existing or planned), possibly reducing the quality of the scene.

Magnitude	Criteria (general guide only, some or all may apply)
Low	▪ Small in scale (bulk and height) and extent of area affected ▪ Temporary, or if permanent, visual effects able to be reduced substantially over time ▪ The site is less visually prominent ▪ The viewer position is usually to the south of the facility ▪ The viewer sees a small portion of the facility (typically less than a quarter (25%) and/or from a further distance) ▪ The proposal forms a visible and recognisable new element within the overall scene, yet one that is relatively compatible with the surrounding character (either existing or planned) and would not generally reduce the quality of the scene.
Negligible	▪ The proposal constitutes only a minor component of the wider view, which might be missed by the casual observer or receptor. Awareness of the proposal would not have a marked effect on the overall quality of the scene.

2.5.3 Level of Impact

By combining sensitivity and magnitude of change, an approximate level of impact to either landscape character or visual impact to viewpoints is ascertained, as shown in **TABLE 2-3** (as adapted from Roads and Maritime, 2013). The range of overall impact level (to both the landscape character and visual impact to surrounding viewpoints) can be either beneficial or adverse, with six possible rankings: high, moderate-high, moderate, moderate-low, low, and negligible.

TABLE 2-3: LEVEL OF IMPACT

Matrix of relationship between sensitivity and magnitude					
		Magnitude			
		HIGH	**MODERATE**	**LOW**	**NEGLIGIBLE**
Sensitivity	**HIGH**	High	Moderate - high	Moderate	Negligible
	MODERATE	Moderate - High	Moderate	Moderate - Low	Negligible
	LOW	Moderate	Moderate - Low	Low	Negligible
	NEGLIGIBLE	Negligible	Negligible	Negligible	Negligible

3 Site context and description

This section of the report describes the Proposal site and its surroundings. It identifies any important visual resource areas (including sensitive scenic, historic, or cultural resources) and other sensitive viewpoints (residential areas, roads, etc.) that could have views of the Proposal.

3.1 Site context

Maryvale is a rural area approximately 15km north-west of Wellington, the nearest town. Dubbo is 39km north-west. The area is part of the NSW Central West wheat-sheep zone [6], and is typical of the undulating, agricultural, broadacre farming areas within the mid-western region. An image of the Maryvale rural area is shown on **FIGURE 3-1** to illustrate landscape character.

FIGURE 3-1: TYPICAL LANDSCAPE CHARACTER OF MARYVALE

The locality of Maryvale is home to 159 residents and there are 63 dwellings[7]. Two main roads - the Mitchell Highway (the main vehicular route between Dubbo and Sydney) and Cobbora Road (which connects Wellington to the Golden Highway) - provide access for Maryvale residents to Wellington.

[6] Australian broadacre zones and regions. http://apps.daff.gov.au/agsurf/regions.html#122. Accessed 12 January 2018

[7] NSW Government Spatial Services, Department of Finance, Services and Innovation. http://maps.six.nsw.gov.au. Accessed 12 January 2018.

Maryvale is also traversed by the Main Western Railway line which connects western regions of NSW to Sydney. The Mitchell Highway and the Main Western Railway line are both west of the Site (refer to **FIGURE 1-1**). Cobbora Road lies east of the Site.

Land in the Maryvale area has been developed for agricultural purposes such as crops (wheat and canola) and grazing (sheep and cattle). Large paddocks of improved pastures, rural residences, farm sheds, water tanks, trucks and harvesters are typical features of the area. During harvesting, dust plumes are common. West of the Mitchell Highway properties are smaller in size and there is a higher density of rural lifestyle lots.

The dominant background colours common to the area are the colours of the crops (seasonally changing from bright greens to pale, muted yellows) and pastures (light, bright greens to light browns and yellows), scattered tall vegetation (dark grey-green), soil (red-brown), and surrounding vegetated ridges (soft deep blue).

Farm sheds and associated farming infrastructure are made of sheet metal, concrete or timber. Some surfaces, particularly metal-clad roofs, are highly reflective. Power lines and tall transmission lines cross the paddocks and run along the road corridors. They generally appear as dark vertical lines via their steel or timber pole construction.

Approximately 6.5km to the south-east of the Site, along Goolma Road, is a large-scale intensive poultry farm. The Wellington Correctional Facility is also along Goolma Road (approximately 7.25km from the Site) is also the Wellington Correctional Facility. The Correctional Facility and the poultry farm may be sources of artificial night lighting.

Three kilometres (3km) to the east of the Site is Wellington airport. This is a small airport that only caters for private light planes.

3.2 The Site

The Proposal location at "Waroona", 121 Maryvale Road, and "Scarborough House", 801 Cobbora Road (the "Site"), is shown on **FIGURE 3-2.**

The Site is accessible from the Mitchell Highway and Cobbora Road via Maryvale Road (south of the Site), and via Combo Road (north of the Site). Running between Maryvale Road and Combo Road is Seatonville Road, which forms the Site's western boundary. Maryvale Road, Combo Road and Seatonville Road are all unsealed.

The Main Western Railway is within 500m of the Site at its closest point. The Mitchell Highway is approximately 900m from the Site at its closest point. Existing 132KV transmission lines traverse the Site.

With the exception of the roads, railway and electricity transmission line, land use within and immediately around the Site is agricultural and rural residential. The Site has been mapped (at a regional level) as "Biophysical Strategic Agricultural Land" by the NSW DPE. This indicates the land has high quality soil and water resources capable of sustaining high levels of productivity.

FIGURE 3-2

Existing site features

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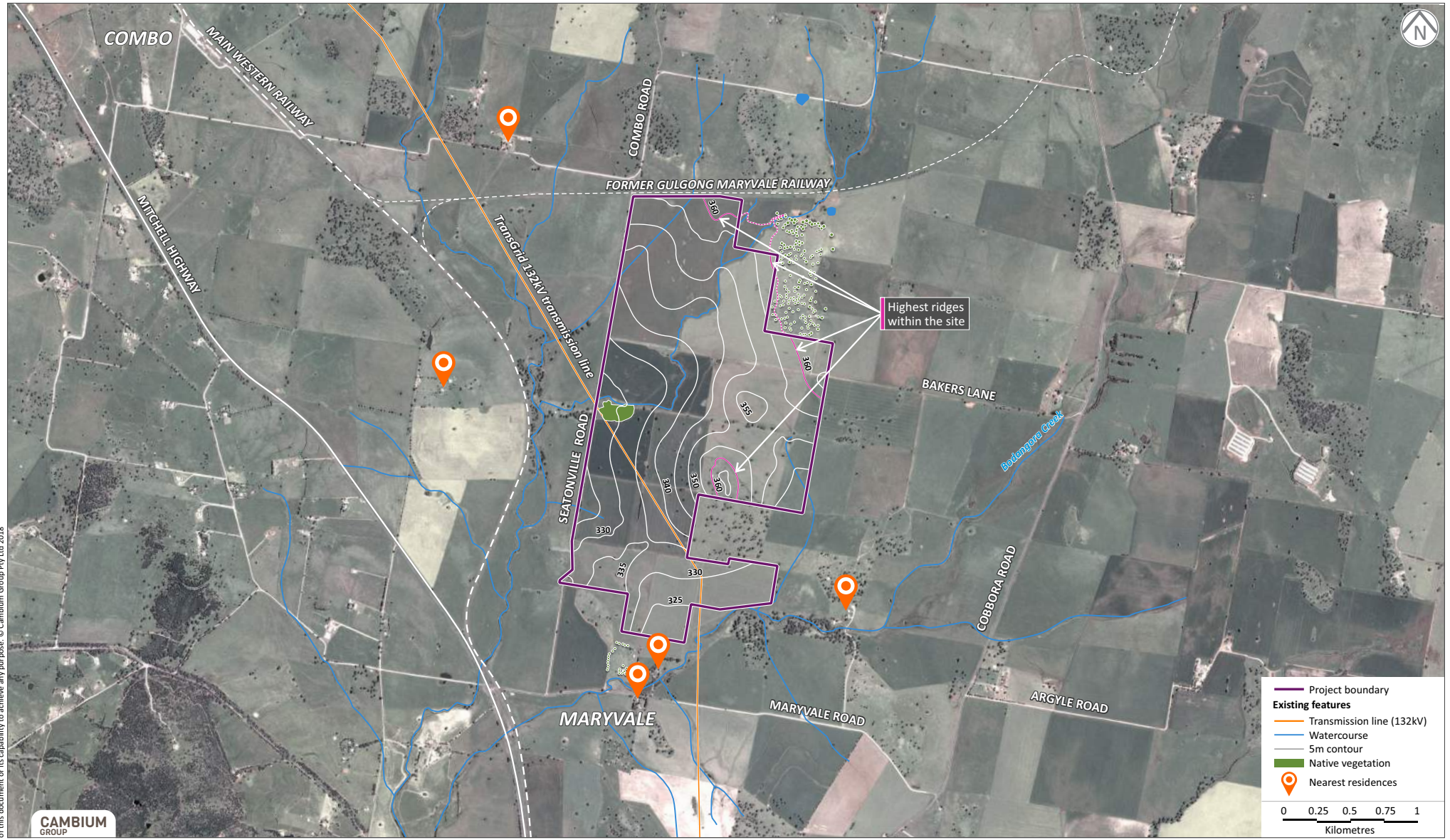

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There is an existing homestead within the southern portion of the "Waroona" property (not within the proposed solar farm Site). There are also fences, agricultural sheds, and farm equipment located over both properties.

The nearest neighbour is located along Combo Road, approximately 1km north-west of the Site (469 Combo Road). There are four other residences within 1.5km of the Site: one to the west of the Site (1148 Mitchell Highway), and three located to the south and south-east of the Site along Maryvale Road (112, 121 and 265 Maryvale Road). However, two of these properties (121 and 265 Maryvale Road) are owned by the landowner of "Waroona".

Another 10 residences are within 2km of the Site, most being located west of the Mitchell Highway. Twenty-seven further rural residential lots are sited west of the Mitchell Highway, within 5km of the Site, along Twiggs Road, Phillipsons Lane, Ponto Falls Road, Tarwong Lane and Whiteleys Lane.

3.2.1 Heritage

An Aboriginal Archaeological Assessment (August 2018) was prepared for the Site by Kelleher Nightingale Consulting Pty Ltd. The assessment identified seven archaeological sites within the Site boundary. The Aboriginal archaeological sites were located in close proximity to creeklines within the Site (Bodangora Creek and an unnamed tributary of Maryvale Creek). The creek corridors are outside the proposed solar panel footprint and would not be impacted by the Proposal.

There were no non-aboriginal historic heritage places or items identified at the Site.

3.2.2 Vegetation

The Site has been mostly cleared of trees for pastoral purposes, however, there is a dense area of native trees adjacent to the creek in the western mid-section of the Site, and a large number of trees scattered over two higher ridges. Groundcover comprises a mix of introduced grass, pasture and weed species which have traditionally been used by the grazing livestock.

During the second site inspection (June 2018), the region was heavily impacted by drought and ground vegetation was reduced.

A detailed Biodiversity Assessment has been prepared as part of the EIS which provides further details on existing vegetation and biodiversity.

3.2.3 Landform

The Site is low lying and gently undulating. The highest ridges within the property are shown on **FIGURE 3-2.** The elevation of the property ranges from 320 to 360m ASL (above sea level).

There are numerous, ephemeral, small creeks across the site which flow to the Macquarie River, over 4.5km south of the Site.

3.3 Planning and regulatory requirements

3.3.1 Proposed Developments

The Proposal occurs within the Dubbo Regional Council LGA. The LGA has two Local Environmental Plans (LEPs), including the Wellington LEP 2012. Under Wellington LEP, the Proposal area is zoned Primary Production (RU1 zone).

Electricity generating works are not permitted within the RU1 zone under the LEP. However, clause 34(7) of the Infrastructure State Environmental Planning Policy (ISEPP) provides that developments for the purpose of 'solar energy systems' may be carried out with consent on any land, except as prescribed by subclause 34(8). As such, electricity generating works such as the proposed Maryvale Solar Farm are permissible with consent.

3.3.2 Scenic provisions

There are no specific documents relating to scenic protection within the western plains region, however, one of the aims of the Wellington LEP 2012 is:

> *to facilitate and encourage sustainable growth and development that…protects and enhances environmentally sensitive areas, ecological systems, areas of a high scenic, recreational or conservation value, and areas that have potential to contribute to improved environmental and scenic outcomes*[8]

3.4 Renewable energy developments

Other renewable energy facilities have been constructed in the region and further facilities are proposed. Approved energy facilities include:

- Dubbo Solar Hub: 26MW, 90ha solar farm located on Eumungerie Road 25km north west of Dubbo
- Brocklehurst Solar Farm: 29MW solar farm, 16km north of Dubbo
- Nevertire Solar Farm: 105MW solar farm. Nevertire is located 126km west of Dubbo.

These facilities are distant from the proposed Maryvale solar farm, being located on the northern or western side of Dubbo.

Closer to the Site is an approved a wind farm and solar farm. Bodangora Wind Farm comprises 33 wind turbines and is located approximately 10km to the north-east. Wellington Solar is an approved 490ha solar PV farm located on Goolma Road (approximately 4.3km from the Site in a straight line, or 7km by road). Construction of both facilities is underway. Their location is shown on **FIGURE** 3-3.

[8] Clause 1.2(2)(c)(iii), Wellington LEP 2012

Plans for additional PV solar farms in the Wellington area are being considered by the Proponent of the Maryvale solar farm (Photon Energy) at Mumbil and Suntop. The proposed Mumbil solar farm would be approximately 201ha in size and located south-east of Wellington (approximately 27.5km from the Site in a straight line, or 36km on road). The proposed Suntop solar farm would be approximately 513ha in size and located on the western side of the Mount Arthur Reserve, west of Wellington, and south-west of Maryvale (approximately 14.5km from the Site in a straight line, or 21km on road).

A large solar farm (approximately 818ha) is proposed by AGL just 2km from the Site (in a straight line, or 5km by road). Wellington North Solar Plant would be located south-east on Goolma Road, and adjacent to the approved Wellington Solar.

Fifteen kilometres east of the Site another wind farm is proposed. Uungula Wind Farm would comprise 127 wind turbines.

The locations of the existing and proposed solar and wind energy facilities in the vicinity of the Proposal are shown on **FIGURE 3-3.**

The cumulative impact of the existing and proposed energy developments is considered at **SECTION 11.**

FIGURE 3-3

Wind and solar farms in the Wellington area

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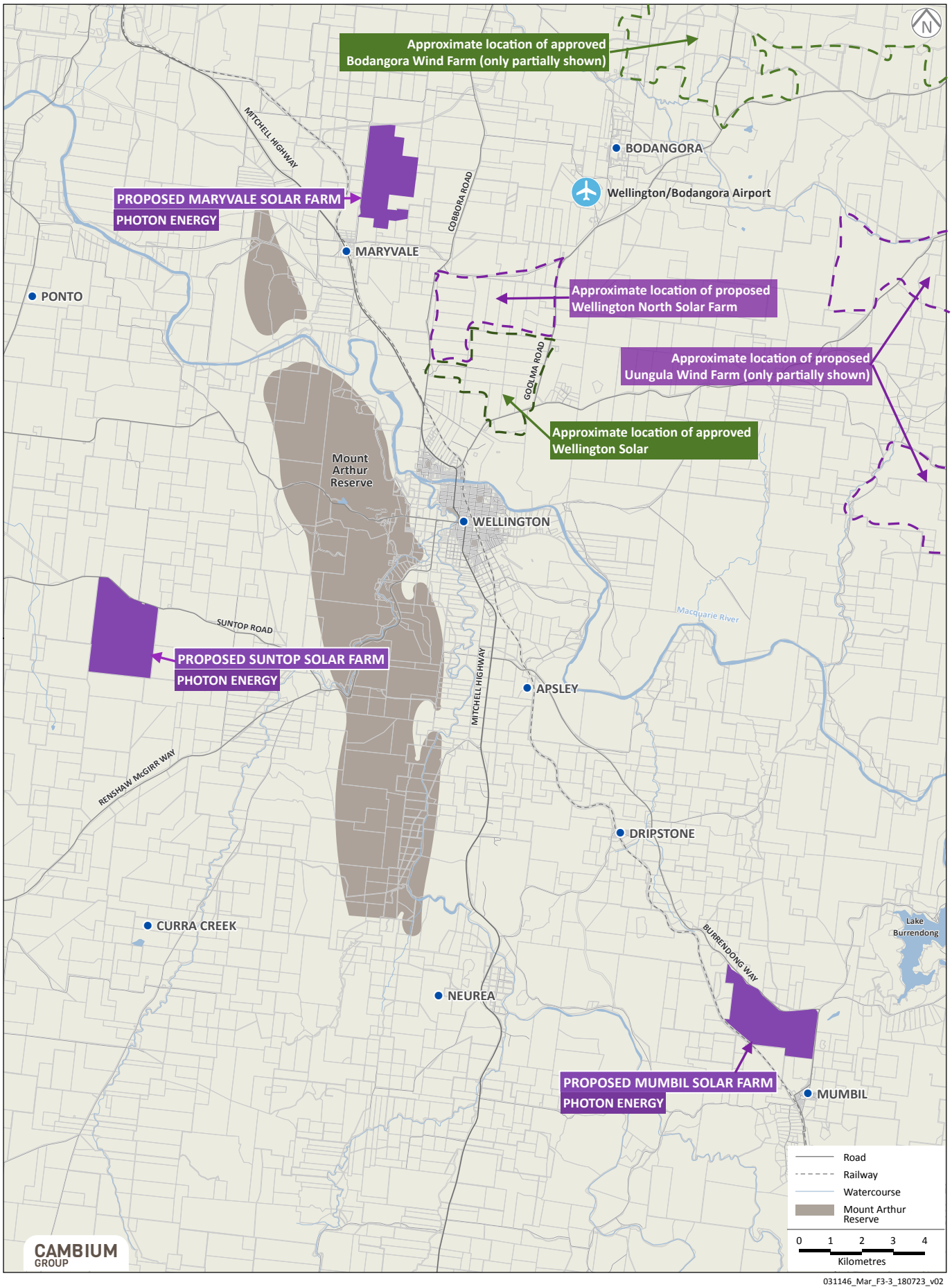

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4 Description of the Proposal

This section of the report presents information about the Proposal, describes the visual characteristics of the solar farm and sources of potential visual change associated with the Proposal.

4.1 The Proposal

The Proposal would consist of an estimated 450,000 PV solar panels installed on a single axis tracker system across the Site. The single axis tracker system would comprise groups of east-west facing PV modules (each approximately 2m x 1m in area) that would tilt from +60◦ angle east in the morning, to -60◦ angle west in the afternoon, to follow the sun throughout the day. At full tilt, the panels would be 4m high with 11m spacing between rows.

A substation would be installed within the Site in the vicinity of the existing electricity transmission lines near Seatonville Road. The substation would connect to the existing transmission lines (owned by Essential Energy) and transmit power generated by the solar farm to the local energy grid. Ancillary infrastructure, such as roads and buildings, would also be required to support the operation of the solar farm. (Works undertaken by Essential Energy to support the Proposal are not part of this assessment).

In summary, the Proposal comprises the following elements:

- 375ha of solar PV modules (2m x 1m) mounted on steel posts to achieve a maximum panel height of approximately 4m
- A 132kV substation (60m x 80m) on a concrete slab, including two transformers and associated 132kV switchgear
- Inverters and inverter stations (to collect and convert the energy produced by the PV panels)
- Underground cabling and other electrical infrastructure (eg security systems)
- Maintenance compound (comprising shipping container/s approximately 40')
- A 1.8m high wire link security fence with 24/7 surveillance cameras installed around the perimeter of the Site
- Landscaping and environmental works
- Upgrading parts of Seatonville Road, Maryvale Road, and the Maryvale Road/Cobbora Road intersection
- Construction of a main access road for all access and egress for the Site and substation from Seatonville Road
- Internal Site maintenance and access tracks.

The key elements of the Proposal, including the approximate footprint of the solar PV modules, are shown on **FIGURE 4-1.**

FIGURE 4-1

Proposed site layout

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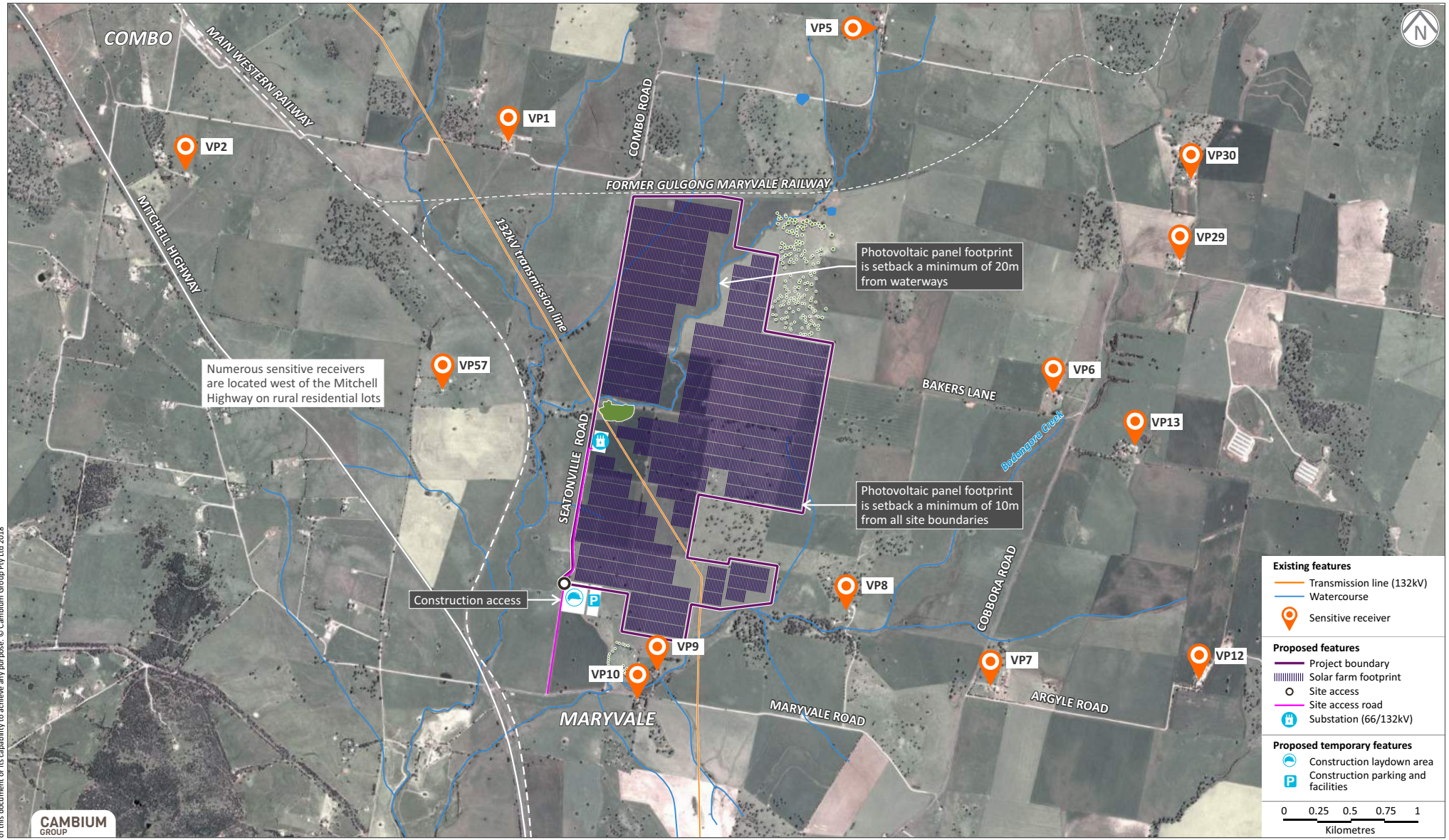

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The solar panel footprint would avoid existing surface water bodies on the Site where possible. A buffer of 40m would be provided between infrastructure and any waterway and a 10m buffer would be provided along all Site boundaries. The footprint would also avoid the majority of tall, woody vegetation present.

The operational life of the solar farm is expected to be 25 years at which point the panels would either be replaced for operations to continue; or removed and the Site decommissioned and rehabilitated.

4.2 Main components relevant to visual impact assessment

The main components of the Proposal are discussed below. Potential visual issues that may be associated with solar farms are discussed at **SECTION 5.**

PV modules

An estimated 450,000 PV panels would be installed. The PV panels would be constructed of dark-coloured material covered with an anti-reflective coating. Each 2m x 1m panel is comprised of 72 high efficiency monocrystalline cells with glass and aluminium frames.

The PV panels would be arranged in groups (arrays) which would run north/south, mounted on steel posts in rows approximately 11m apart (to facilitate movement of the panels and provide access for maintenance).

An example of the type of panels to be installed is shown at **FIGURE 4-2**.

FIGURE 4-2: EXAMPLE OF PV PANELS IN SINGLE AXIS TRACKING SYSTEM (PROVIDED BY PITT & SHERRY)

The mounting structure would provide a maximum panel height of approximately 4m at full tilt which occurs twice during the day - in the morning when facing east (approximately 9am), and in the afternoon when facing west (approximately 3pm). During the day, the panels would slowly tilt and in the middle of the day lie flat facing up, resulting in a panel height of approximately 2.3m at midday.

The steel posts of the mounting structure would extend between 1.6 to 4m below ground depending on geological conditions. The ground surface under the panels would essentially remain unchanged and covered with pasture grasses. An example of the type of mounting structure to be installed is shown at **FIGURE 4-3.**

FIGURE 4-3: EXAMPLE OF GROUND-MOUNTING ARRANGEMENT (PROVIDED BY PITT & SHERRY)

Inverters

Energy generated by the PV panels would be transferred from the arrays via cables to inverters. Approximately 10,000 PV panels would connect to each inverter. Two to three inverters would be housed within a single container ("inverter station") located at the end of rows of PV panels. There would be approximately 36 inverter stations across the Site.

The inverter stations would convert the energy from direct current (DC) to alternating current (AC). An image of the type of PV solar inverter station to be installed is provided at **FIGURE 4-4.**

FIGURE 4-4: EXAMPLE OF PV SOLAR INVERTER & INVERTER STATION (PROVIDED BY PITT & SHERRY)

The inverter stations to be installed would likely be one, or a combination of, the following options:

- 4.92MW Ingeteam CON40 inverter stations (12.2m long x 2.4m wide x 2.9m high), housed in a 40' container
- 3.20MW Ingeteam CON20 inverter stations (6.1m long x 2.4m wide x 2.6m high), housed in a 20' container.

The inverter stations would be delivered fully containerised and be installed on concrete foundations, slightly elevated above the ground.

Colour treating the inverters, inverter stations, and ancillary structures proposed at the Site is one of the numerous mitigation measures proposed. A dark grey is proposed for the structures (although final colour choice would be determined during detailed design). A dark colour would have a receding effect, decreasing the visibility and contrast of the structures. Mitigation measures are discussed in detail at **SECTION 10.**

Substation

Energy would be conveyed from the inverter stations to the substation via underground electrical cabling, installed at a depth of between 500-600mm (subject to detailed design). Some electrical cabling may be above ground to enable crossing of waterbodies on Site.

The substation is proposed to be located within the Site along the Seatonville Road boundary, set back approximately 2km from Maryvale Road. An access road would be formed from Seatonville Road to access the substation.

The substation would be operated by Essential Energy. The substation is likely to include:

- A security entry gate,
- 3m high security fencing around the substation,
- 33kV switchgear building and auxiliary services building, and
- two transformers which would increase the voltage of the energy received from the inverter stations to a level that could be transmitted from the Site via the 132kv powerlines.

An example of a similar substation to that proposed is shown at **FIGURE 4-5.**

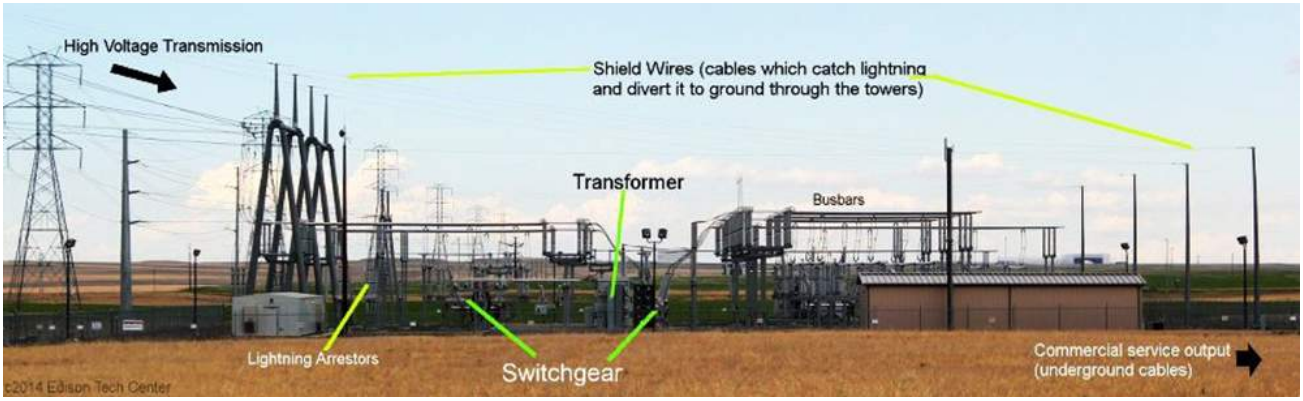


FIGURE 4-5: EXAMPLE OF A SIMILAR SUBSTATION TO THAT PROPOSED (PROVIDED BY PITT & SHERRY)

The substation would be constructed on a concrete pad, approximately 60m x 80m, with gravel placed around the equipment to restrict vegetation growth and provide a safe working environment in accordance with Australian Standards.

A chain link fence with upper barbed strands approximately 3m high would be installed around the substation to maintain security. The substation would have a 20m asset protection zone (APZ) in accordance with design and safety standards.

Site access

The main access road to the Site would be Seatonville Road, an unsealed single-lane road accessible via Maryvale Road (south of the Site), or Combo Road (north of the Site). Road upgrades are proposed to allow for two-way traffic and truck movements to the Site:

- along Seatonville Road between the proposed Site entrance and Maryvale Road
- The intersection of Seatonville Road and Maryvale Road
- The water crossing to the east of the intersection of Maryvale Road and Seatonville Road, and
- The intersection of Maryvale Road and Cobbora Road would be upgraded to provide a minimum left turn deceleration lane for the trucks.

The entrance into the Site would be constructed off Seatonville Road approximately 800m from the Seatonville Road/Maryvale Road intersection. The main entry would also provide access to the substation.

Vehicular access would be required across the Site during operations. Internal access roads would be formed between the 11m wide panel installations, however, would not be sealed or delineated due to the low frequency of access.

All access and maintenance roads would be maintained throughout the construction and operation of the solar farm, and Maryvale Road would be maintained during the construction phase.

Parking and storage

A small parking area may be provided for worker's utility vehicles to park during periodic Site maintenance.

Two 40' shipping containers would be maintained at the Site for storage of maintenance equipment. They would be installed within the area used as a compound during construction.

Emergency firefighting water would be stored in a tank (approximately 50,000 litres (L) in size - likely to be 4-5m in diameter and approximately 2-3m high), located near the storage containers.

Colour treating the storage containers and water storage tank (same as the inverters and other ancillary structures) is proposed to reduce their visibility.

Site fencing

The perimeter of the Site would be bounded by security fencing (at least 1.8m high) with lockable access gates at the Site entrance, and with 24/7 surveillance cameras. An example of the Site security fencing is shown at **FIGURE 4-7.**

The substation would have its own, additional security fencing and additional security gate.

FIGURE 4-7: EXAMPLE OF A SIMILAR SECURITY FENCING TO THAT PROPOSED (SUPPLIED BY PITT & SHERRY)

Planting

The Proposal for the solar farm includes perimeter planting along sections of the western, eastern and southern boundaries of the Site to reduce direct views into the Site. A Concept Landscape Plan is provided at

FIGURE 10-1. Planting is one of numerous mitigation measures proposed for the solar farm. Mitigation measures are discussed in detail at **SECTION 10.**

4.3 Construction

The construction phase of the Proposal is expected to take approximately 12 months. It is anticipated that the solar farm would be constructed in 1ha stages – with up to 10 stages in construction at any one time. No construction works are proposed to occur at night. Standard construction hours would be adopted.

Construction traffic would enter the Site from Cobbora road on to Maryvale Road and then Seatonville Road. Site access would be from the southern end of Seatonville Road.

Site establishment

Prior to construction, a compound and construction laydown area would be installed in the southern portion of the Site. The location of the construction compound is shown on **FIGURE 4-1**. Access to the construction compound would be via a temporary access road off Seatonville Road.

The temporary compound area would comprise:

- Construction offices (one 12m x 3m site office, two 12 x 3m break rooms)
- Parking area
- Staff amenities
- Security measures including fencing and CCTV.

Preparation of the construction laydown area would include limited site grading, lining the ground surface and placing a gravel cap over the lining. This area would be used for operational facilities when the construction phase is complete.

Vegetation clearance

Vegetation to be retained would be protected. A buffer of 40m is proposed between infrastructure and any waterway and the majority of existing vegetation on Site would be avoided.

Minor vegetation clearing is proposed. Vegetation clearance would be targeted to grasses, shrubs and isolated trees.

Preliminary works

Early works would include:

- Pile driving (approximately 1.6m to 4m deep) for the supporting PV mounting structures for the solar panels
- Minor earthworks beneath the PV panels to achieve more consistent gradients
- Minor earthworks to prepare the ground for footings and concrete slabs for the inverters and inverter stations
- Drainage works (as required)
- Road and intersection upgrade works

- Trenching (up to 1.2m deep) to lay the interconnecting cabling. The trenches would be backfilled.

Earthworks would be localised/targeted and temporarily expose soils. Broadscale, levelling/benching across the Site is not required. A range of plant may be used including scrapers, bulldozers, excavators, rollers, trucks, backhoe and loaders.

Delivery

Most of the infrastructure for the solar farm would be pre- fabricated off-site, delivered and then assembled on-site. Trucks would transport the modular equipment to Site via Cobbora Road, Maryvale Road and Seatonville Road. This would be the major transport route for all Site vehicles during construction.

During the peak construction period, the traffic volume is expected to be up to 40 heavy vehicles and 50 light commercial vehicles travelling to the Site each day.

A truck parking area would be provided at a suitable location either within Wellington or on the outskirts of the town. In the event a suitable location cannot be found, a suitable site at Dubbo would be investigated.

Installation

Following ground preparation, the following would be installed:

- steel post and rail foundation system for the solar panels
- PV panels and DC wiring beneath the panels
- electrical cabling
- inverters and inverter stations
- the two shipping containers to be used for storage of maintenance equipment installed on compacted hardstand, and
- Emergency firefighting water storage tank.

Plant and equipment required to install the components of the solar farm would likely include excavators, cable trenching equipment, elevated work platform, backhoes, bulldozers, scrapers, rollers, pile drivers, trucks, fork-lifts and cranes.

The PV mounting structures would be driven or screwed into ground using a pile driver or similar. Additional support structures would be attached to the steel mounting structures and the PV panels would then be crane-mounted onto the support structures.

Construction of the substation would require bulk earthworks. The footprint of the substation (60m x 80m) would be cleared of vegetation and the soils exposed. Construction would include installation of steelwork, electrical connections and transformers. New poles and powerlines would be installed (if required) and the substation would be connected to the existing transmission line to convey the energy.

The main Site entrance along the western boundary of the Site would be constructed, fencing installed, and proposed planting undertaken.

4.4 Operation

The Proposal would operate 24 hours a day, 7 days a week, however, this would not involve the presence of staff on-site with the exception of periodic maintenance. The Solar Farm would be monitored and operated remotely therefore requiring minimal on-site maintenance personnel.

Irregular maintenance activities would be undertaken during standard working hours (except in an emergency) and are expected to include:

- Panel cleaning
- Repairs or replacement of infrastructure, as required
- Mowing activities to control vegetation.

Up to 10 maintenance staff may be required for Site operations. On some occasions, such as during a major substation shutdown, additional maintenance staff may be required.

Night operations are not required for the solar farm or for the substation, and ordinarily, there would be no night lighting at the site. Any lights installed would only be illuminated in an extraordinary event (such as an emergency).

4.5 Decommissioning and rehabilitation

The Proposal is intended to be operational for approximately 25 years. At the end of this period, the solar farm would either be decommissioned or updated for continued use. If the Site is decommissioned, all structures (with the exception of the substation) would be removed and the Site would be rehabilitated and returned to agricultural use.

5 Potential visual concerns

A review (by others) of studies of social-cultural attitudes and renewable energy acceptance, based on surveys from 13 countries, concluded that "the singularly most important concern about renewable energy is visual intrusion"[9].

This section of the report briefly discusses, and seeks to address, some of the potential visual concerns the community may have related to PV solar farms. The impact assessment presented in **SECTIONS 6** and **7** takes account of concerns where relevant.

5.1 Scale

Large scale solar facilities can occupy very large land areas, have regular, strong geometry, and can be visible for long distances. One study found that large PV solar facilities are not uncommonly visible at a distance of 16km[10], yet it is notable that, when viewed from long distances, the facilities may not be recognisable as solar facilities.

FIGURE 5-1 provides a visual comparison of the height of PV panels compared to other familiar elements, illustrating the overall low profile of the Proposal.

Although large, such solar facilities have visual advantages in that they are generally low to the ground, have low visual contrast, and can appear as shadows from a distance [11]. Depending on the project layout and contrast, in some cases they may appear to be natural features, while in other cases, they may lack sufficient visual detail to be identified positively as solar facilities[12].

5.2 Glint and glare

Glint is generally defined as a momentary flash of light. Glare is a longer and for some time continuous source of light reflection.

In desert areas, glare – bright enough to cause strong discomfort - has been observed from parabolic trough solar facilities which use mirrors or glass panels to concentrate thermal solar power [13]. Glare sources are believed to be associated with reflections from the heat transfer fluid tubes (and/or associated components attached to the tubes) of these types of facilities, and has been observed at distances of up to 6km[14].

The Proposal does not use these technologies which concentrate the sunlight and reflect the sun to one point. The PV solar modules proposed to be installed are non-reflective and do not incorporate mirrors.

[9] Apostol, Dean (2017) *The Renewable Energy Landscape*. Routledge. (Apostle 121)

[10] Sullivan, R. et.al. (2012). *Visual impacts of utility-scale solar energy facilities on southwestern desert landscapes.*

[11] Sullivan et al. (2012). p14

[12] Apostol, Dean. (2017) (Apostle 21)

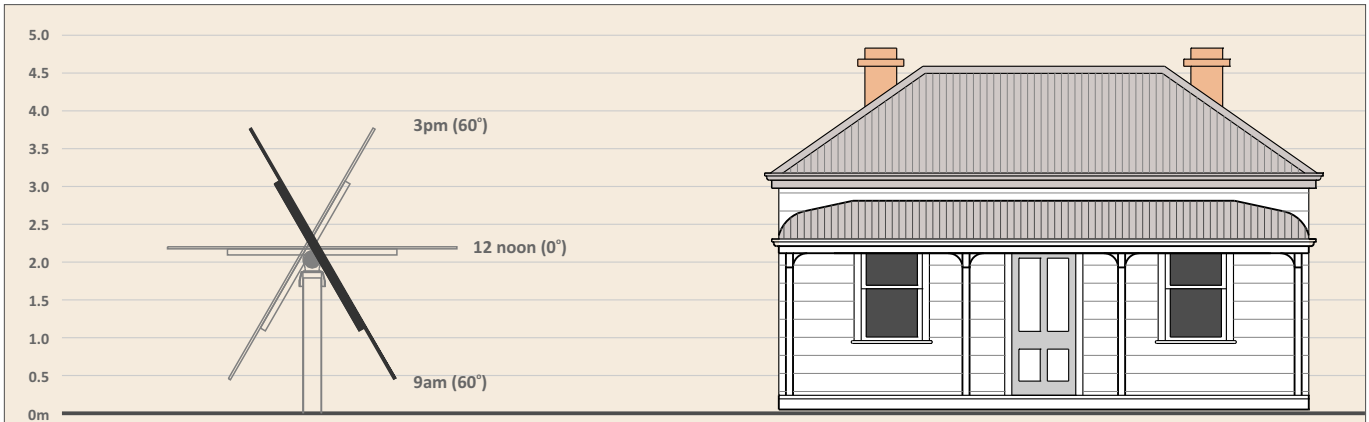
[13] Sullivan et al. (2012). p16

[14] Sullivan et al. (2012) p17-18

FIGURE 5-1

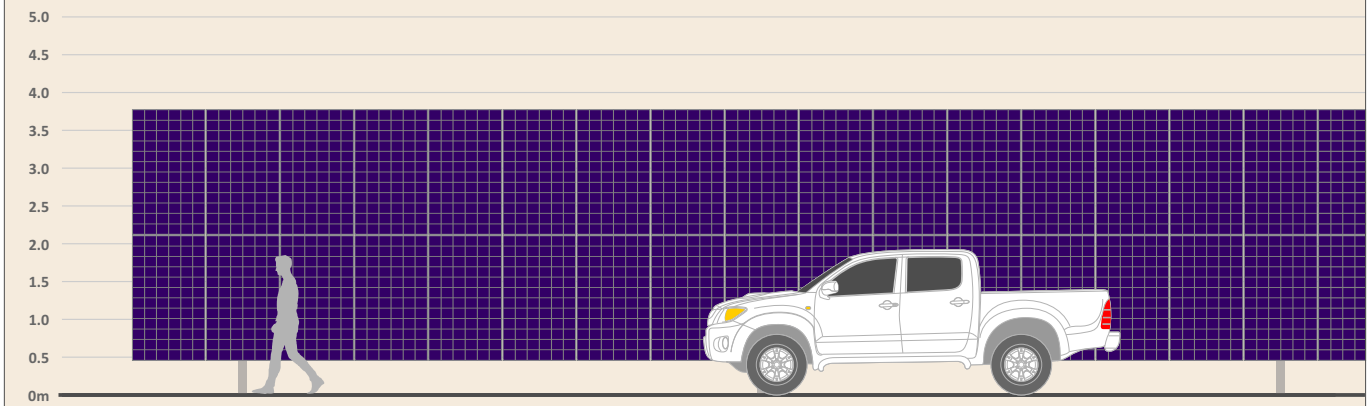
Photovoltaic solar panel height comparison (Tracking)

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

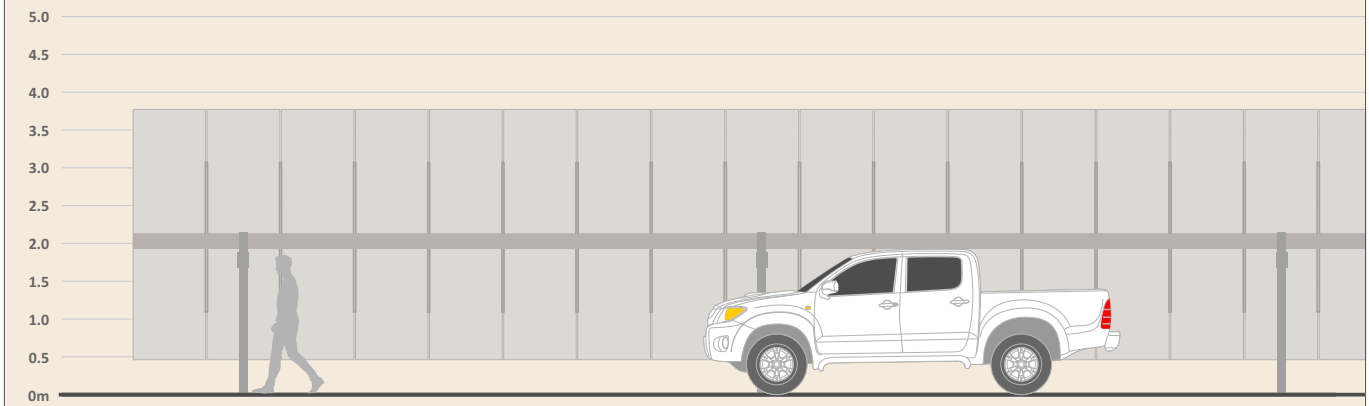


NORTH/SOUTH ELEVATION

FARM HOUSE



EAST ELEVATION (9am - 60°)



WEST ELEVATION (9am - 60°)

INDICATIVE ARRANGEMENT

CAMBIUM GROUP

The *NSW Department of Industry Resources & Energy: Solar Farms in NSW Fact Sheet* (June 2016) states:

> *Solar farms are not considered to be reflective. Photovoltaic panels are designed to reflect as little light as possible (generally around 2% of the light received) to maximise their efficiency, absorb sunlight and convert it to electricity. Minimising the light reflected from solar panels is a goal of panel design, manufacture and installation. The glare from panels is significantly less than that from bodies of water.*

A comprehensive study of potential for glint and glare was undertaken for the proposed Sapphire Solar Farm near Glen Innes, NSW (Pager Power, November 2017). The proposed solar farm at Glen Innes included PV solar 'tracking panels'.

The study reviewed a substantial amount of available literature and found that:

- *Glint and glare effects can only ever occur when the weather is clear and sunny*
- *The reflections produced are of intensity similar to or less than those produced from still water and significantly less than reflections from glass and steel*
- *In the scenario where a solar reflection is possible towards a road user or resident in a surrounding dwelling, the individual will also be looking in the general direction of the Sun. This means the Sun and solar reflection will be visible simultaneously. The Sun is a significantly brighter source of light*
- *Lastly, at any one location, only a particular area of solar panels will produce a solar reflection towards it.*

The study concluded:

- *'the overall expected impact upon road users with respect to safety is classified as Low (at worst) where the reflecting solar panels are visible*[15]
- And that for residents, *'The solar reflections would last for up to 20 minutes per day for up to 6 months from windows with a clear view of the reflecting solar panels... In all cases, a clear view of the reflecting solar panels at the particular time of day when a solar reflection was geometrically possible would be required. In addition, the weather would also have to be clear and sunny…the resulting impact significance is Low to Moderate. If screening removes the solar panels from view, no Impact will be possible.*
- *If mitigation were to be requested, the most appropriate form would be the installation of screening in the form of vegetation.*

Therefore, based on available information, and in-line with the *NSW Department of Industry Solar Farm Fact Sheet*, glint and glare are unlikely to be an issue for surrounding residents or road users.

[15] Pager Power, 2017, p3

5.3 Light refraction

A 'mirage' effect — glittering or shimmering — may be observed at PV facilities. The effect is similar to the shimmering seen over a bitumen road on a hot day which can make the road surface appear as though it is wet, rippling or reflective (refer to **FIGURE 5-2**).

FIGURE 5-2: 'MIRAGE EFFECT' ON ROAD ON A HOT DAY

The effect occurs because the surface of the road is hotter than the air around it. In the case of PV panels, heat from the panel surface warms the air above it, distorting (refracting) light waves. The air wobbles and makes the colour above the surface appear brighter and bluer[16].

The 'mirage' effect is not bright enough to cause discomfort. It is likely to be only observed during warmer months, at certain times of day and from certain viewing positions. **FIGURE 5-3** shows the effect (although difficult to see) from an elevated position (45m higher), north-east of, and 2.75km from, Royalla Solar Farm, the Australian Capital Territory (ACT). Another image of the Royalla Solar Farm is provided at **FIGURE 5-5.**

It is to be noted that the Royalla Solar Farm is not a directly comparable visual example as it is comprised of fixed-angle panels.

[16] Adapted from:
- The Naked Scientists, 01/06/2008, https://www.thenakedscientists.com/forum/index.php?topic=14849.0
- Physics, 26 May 2011, https://physics.stackexchange.com/questions/10464/why-does-the-road-look-like-its-wet-on-hot-days

FIGURE 5-3: PHOTOGRAPH OF ROYALLA SOLAR FARM NEAR CANBERRA (2.75KM FROM SOLAR FARM)

5.4 Geometric pattern and viewer position

Viewer position in relation to the layout of PV modules also affects the appearance of the solar farm. An image showing viewer position in relation to the rows (arrays) of PV modules is shown at **FIGURE 5-4.** Viewer position determines which side of the PV modules is in view, and therefore which angle of surface is seen with respect to the viewer.

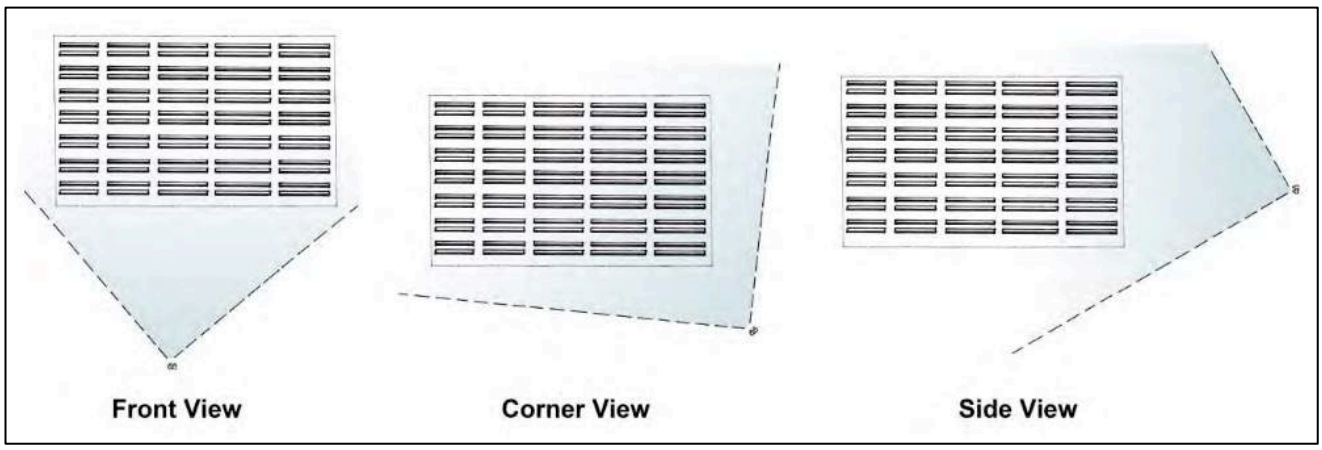


FIGURE 5-4: VIEWER POSITION IN RELATION TO PV PANELS (ARGONNE NATIONAL LABORATORY[17])

From some viewer positions it may be possible to see down the long rows (arrays) of the PV solar modules. If travelling past rows perpendicular to a road, the rapid change in viewer position would result in abrupt changes in angle and pattern of the panels. The colour of the panels would appear to change rapidly from black (when viewing the rear of the panels) to various shades from blue to white (when viewing the face of the panels). The visual change – the lightening or darkening appearance of the panels as the vehicle passes the facility[18] - would only be seen if looking directly down the rows when travelling past at speed and would be momentary[19].

Colour change in relation to viewer position is shown in the image at **FIGURE** 5-5 (taken 200m from the nearest panels at Royalla Solar Farm, ACT). When viewing the face of the panels, the panels appear lighter in colour – with shades of blue to white. Looking at the rear of the panels, the panels appear black as they cast shadow.

However, as previously noted, the Royalla Solar Farm is not a directly comparable visual example as it is comprised of fixed-angle panels permanently facing the same direction. The proposed solar farm would comprise tracking panels which slowly move throughout the day, changing their angle and direction.

[17] Sullivan, R. and Meyer, M. 2014.

[18] Sullivan, R (2012) p22

[19] Sullivan, R et.al. (2012) p22

FIGURE 5-5: ROYALLA SOLAR FARM SHOWING COLOUR CHANGE WITH SIDE VIEW

5.5 Aviation

Aviation warning lights are required for towers and other tall structures which may be a hazard to aircraft. Normally these would be red flashing lights. As the proposed solar panels are low-profile, aviation warning lights are not required.

The solar panels also do not need to be painted white (such as would be required for wind turbines) as an aide to aerial navigation safety. There would be no colour contrast from the solar panels as a result of aviation safety requirements.

There is no movement (visible to the naked eye) that would be associated with the solar farm infrastructure. Therefore, motion would not be an obstruction to aviation.

The Proposal would not include solar towers or other structures that would contrast with dark night skies. The Proposal would not include mirrors or lenses or other reflective surfaces.

It is understood that the Civil Aviation Safety Authority (CASA) has generally advised that large scale solar farms, such as that proposed, are very unlikely to be a hazard to aircraft operations unless they are very close to and aligned to an airport's approach or take off paths. The Proposal does not fall into that category.

5.6 Movement

Fixed solar panels are permanently oriented toward one aspect (north). Tracking PV solar panels, however, slowly follow the daily transverse of the sun in a 180 degree turn from the north-east in the morning, to the north-west by the afternoon. There is a wider range of potential viewpoints which may face moving panels during the day, however, their exposure to the face of the panels would be shorter in duration.

Although solar panels may change their orientation during the day, the movement is usually very slow and not apparent in short-duration views[20].

5.7 Skylining

Skylining occurs when structures are placed on ridgelines, summits, or other locations where they would be silhouetted against the sky. The eye is naturally drawn to prominent landscape features and high points[21]. Examples of skylining can be seen with power poles, telecommunications towers and wind turbines that are installed on ridges in rural landscapes.

PV solar panels are low-profile. Therefore, skylining is unlikely to be an issue unless the panels are located on prominent, exposed, high points, which draws the attention of the viewer.

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[20] Sullivan, R. and M Meyer. 2014. p50

[21] United States Department of the Interior. 2013. *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands*. BMP 6.2.12

5.8 Ancillary structures

PV solar farms require a high number of inverters and ancillary structures to be installed across the Site. Multiple inverter stations are installed at the end of PV solar panel rows to convert the energy produced by the panels. The colour of such ancillary PV solar farm structures may contrast against the background landscape of the solar fam and could have the effect of drawing attention to the multiple structures laid out in a grid pattern across the farm.

The colour of ancillary structures is therefore important. Inverters and other facility components that are colour-treated two to three shades darker than the background landscape colour, better match the surroundings and decrease their visibility and contrast. White is generally the most conspicuous colour. Lighter colours should be avoided.

An example of white coloured inverters and other solar farm buildings is shown at **FIGURE 5-6,** Royalla Solar Farm, near Canberra, ACT. An example of a colour-treated inverter is shown **FIGURE 5-7,** at Williamsdale Solar Farm, near Canberra**.** These images show that the use of darker, more-recessive colours can lower visual contrast and potential visual impact.

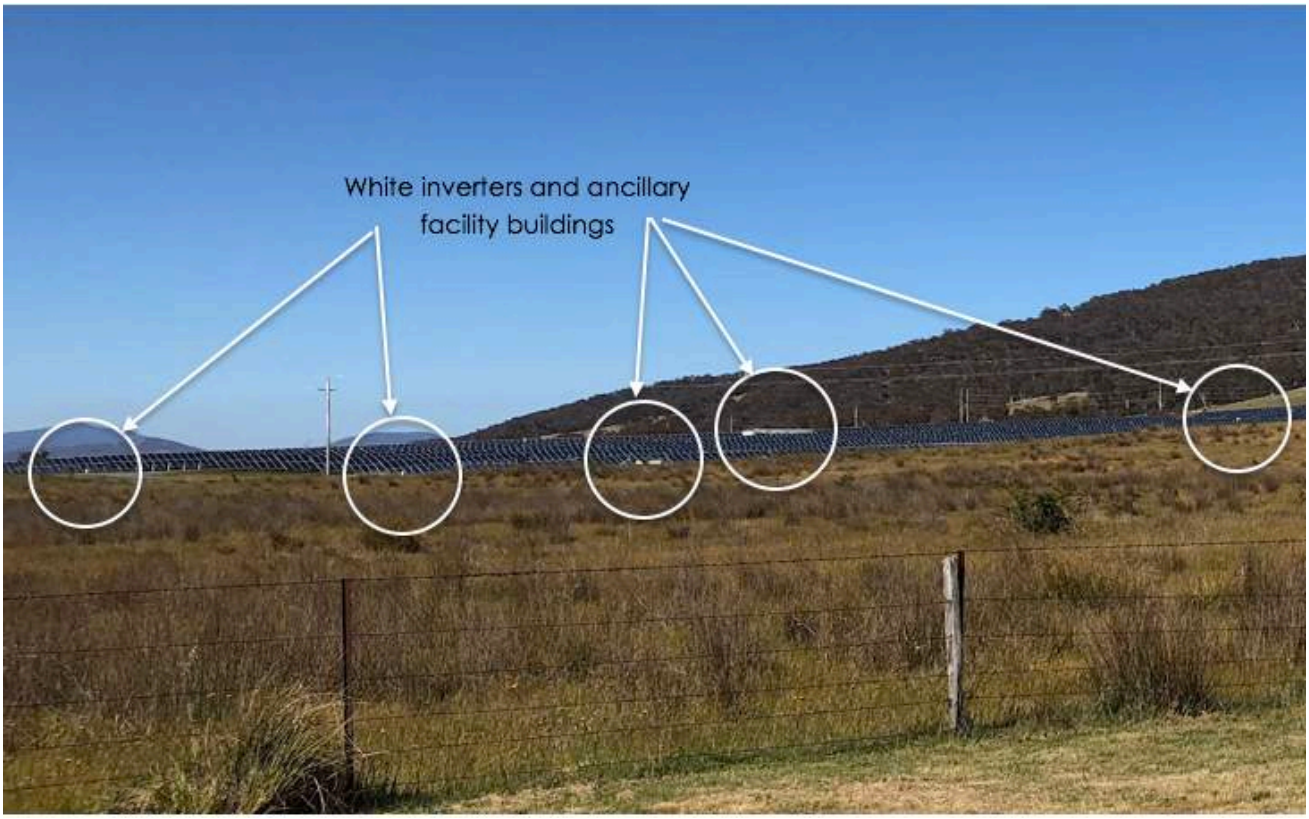


FIGURE 5-6: ROYALLA SOLAR FARM SHOWING WHITE ANCILLARY STRUCTURES

FIGURE 5-7: WILLIAMSDALE SOLAR FARM SHOWING COLOUR-TREATED INVERTERS

6 Impact to landscape character

The landscape character of the vicinity has been described at **SECTION 3.** This section of the report describes the changes in visual quality and character of the landscape caused by the Proposal. As noted in **SECTION 2,** the assessment of impact is based on the combination of two criteria: sensitivity and magnitude of change. (Impact to individual viewpoints is detailed at **SECTION 7**).

6.1 Sensitivity

The existing rural setting of Maryvale is typical of the mid-western region. The landscape occasionally includes industrial-type elements, such as large sheds, and the land surface is often divided into grids and rows via fences, trees, and cropping patterns. However, the installation of the proposed large-scale solar PV farm would introduce a new, significantly large, human-made element into the agricultural landscape.

Existing trees at the Site are taller than the proposed PV panels, however, are relatively few in number, and the panels would cover an extensive land area and appear larger in scale compared to the size of the surrounding paddocks.

The dark colour of the rows of PV panels would contrast against the lighter background of grasses and surrounding paddocks. The colour contrast may be more evident in warmer months during wheat growing and harvesting. The dark colour of the face of the solar panels, and shadows cast by the panels, would contrast against the lighter, brighter colour of the crops. The local landscape of broadacre paddocks, however, also creates a variety of patterns and background colours depending upon the crop or use of the land. Linear shadows are also cast by existing trees, and changes of elevation, within and around the Site.

Using the criteria listed in **TABLE 2-1**, the overall landscape character is rated as having **moderate** sensitivity:

- The landscape does not have particularly high scenic significance; however, it is an attractive, working, rural landscape, typical of the mid-western NSW agricultural area
- The patterning of the area is broadscale with large agricultural farming lots
- There is a small local rural residential population, with most residences located over 1.5km from the Site. (Impact to individual viewpoints is detailed at **SECTION 7**)
- However, the Site is exposed to a large number of road users accessing the Mitchell Highway (approximately 900m at its closest point to the Site), and Cobbora Road (approximately 1.6km at its closest point to the Site).

6.2 Magnitude of change

Construction

The construction footprint would affect a large area – approximately 375ha. During construction, machinery and equipment would operate across the footprint. Exposure of soils would be relatively minor, with the exception of the substation footprint where bulk earthworks would take place. Tree removal would also be relatively minor, with trees being retained along the creekline and over higher ridges.

A key construction impact would be the number of delivery trucks and construction worker's vehicles accessing the Site. Roads around the Site (Cobbora Road, Seatonville Road and Maryvale Road) would be affected initially by the proposed upgrades, then by the number and frequency of transport movements, and potentially dust from unsealed road surfaces.

Using the criteria listed in **Table 2.2**, the magnitude of change to landscape character during construction is rated as **moderate**. There would be:

- Large extent of area affected
- Construction movement, dust, traffic and exposed soils may be visible
- Local roads would be disrupted by upgrades and frequent truck movements
- However, construction would be temporary.

Operation

Once construction is completed, the up to 4m high PV solar panels and inverter stations would be located across the Site. The extent of land covered by the rows of PV panels would be large – occupying an area of approximately 13 paddocks of typical size in the vicinity. However, the undulating nature of the Site would restrict the extent of panels and inverters seen. In addition, given the low profile of the panels, their dark colour and shadows cast, the solar farm would be unlikely to be particularly prominent, especially when viewed at a distance.

The substation located adjacent to the densely vegetated creekline would be partially screened from view, however, it would comprise taller structures which may extend above the height of adjacent trees.

Colour-treating the inverters, as well as other structures on the Site as proposed in the mitigation measures (refer **SECTION 10.0**), would reduce their visibility. Proposed planting at perimeter locations of the PV solar farm (as proposed in the mitigation measures (refer **SECTION 10.0**), would restrict close views of the panels and inverters (in approximately 5 years from construction, allowing time for plants to grow sufficiently). From a distance, the PV solar farm would appear as dark shadow.

Using the criteria listed in **TABLE 2-2**, the magnitude of change to landscape character during operation is rated as **moderate**:

- Large extent of area affected

- The Proposal would be recognisable at close proximity, although would not be visually prominent at a distance
- The scale and colour of the PV solar farm means that it would be a noticeable element in the existing rural landscape, however, given its low profile and dark colour, the extent of contrast would be of a moderate level and should not excessively reduce the quality of the scene and
- The scale of the solar farm would be larger than existing agricultural patterning.

6.3 Level of impact to landscape character

Construction

The moderate sensitivity ranking, combined with the moderate magnitude of change during construction, leads to an overall moderate level of impact.

Operation

The moderate sensitivity ranking, combined with the moderate magnitude of change post-construction, leads to an overall moderate level of impact.

6.4 Summary

The assessment results of impact to landscape character are summarised in **TABLE 6-1.**

TABLE 6-1: SUMMARY OF IMPACT TO LANDSCAPE CHARACTER

	Sensitivity	Magnitude of change	Predicted impact level
Construction	Moderate	Moderate	Moderate
Operation	Moderate	Moderate	Moderate

7 Impact to viewpoints

This section of the report assesses the potential effects of the changes on the viewer experience.

7.1 Identification of viewpoints

Seventy-eight potential viewing points were initially investigated during the initial site inspection (23 November 2017). Identification numbers were allocated to identify each viewpoint.

Site verification determined that 47 private viewpoints and five public viewpoints could potentially see some sections of the proposed solar farm.

7.1.1 Private viewpoints

The majority of the identified viewpoints were from private residences. Private viewpoints are the most sensitive as they provide high frequency views from the private settings of people living at that residence.

Generally, residences with potential viewpoints located within 2km of the Proposal site were assessed as individual viewpoints. However, due to the large number of potential private viewers, and the relatively similar visual experience from some locations, viewpoints beyond 2km were grouped based on their common experience of:

- distance from the Proposal;
- extent of the Proposal likely to be seen; and
- viewer position in relation to the proposed panels.

Access to private properties was not undertaken during the site inspection, however, in general the likely visibility from residential viewpoints could be adequately interpolated from the closest public access to each viewpoint and desktop analysis of aerial and topographic mapping.

7.1.2 Public viewpoints

Public viewpoints provide temporary, transient views; however, they can be accessed by a large number of people.

The Site is partially visible from the Mitchell Highway which forms part of the National Highway A32, stretching from Sydney to Adelaide. This is an important road link for passengers (including tourists) as well as freight and carries a large volume of traffic. The Site is also partially visible from Cobbora Road; and although a secondary road, it also caters to a high number of road users.

Several local roads in the vicinity provide views for residents: Combo Road, Tarwong Lane, and the unsealed access Twiggs Road/Phillipsons Road.

Views from roads are not static. The view is experienced while moving and may occur for long or short periods, and from differing angles and elevations. The 'linear-experience' of travelling presents a constantly changing viewpoint. Hence, viewpoints from roads have been assessed as a 'linear-experience', not as a single viewing point.

There are no public recreational areas, scenic reserves or lookouts in the area that provide public viewing opportunities of the Proposal.

There is also a small airport within 3km of the Site. Views of the Site are likely for operators and passengers of private aircraft.

7.2 Assessment of viewpoints

7.2.1 Assessment

Each viewpoint (viewpoint group or linear viewpoint) identified for assessment is shown in **TABLE 7-1**. The table includes:

- Private viewpoints (VPs) assessed individually
- Private viewpoints assessed as groups, and
- Linear public viewpoints.

The table lists the viewpoints from highest to least impact and presents:

- The key factors affecting each viewpoint's visibility
- The projected impact rating of each viewpoint at the time of construction, and
- The predicted visual impact.

Note that VP (viewpoint) numbers in the table are not consecutive as not all potential viewpoints identified at the time of the initial site investigation (23 November 2017) were assessed as having a view of the Proposal. Also note that views from residences belonging to the landowner of the Site (VP8 and VP9) are not included in this assessment, nor are viewpoints from the roads that are being upgraded as part of the Proposal (Seatonville Road and Maryvale Road).

A map showing the location of each viewpoint and its initial rating is provided at **FIGURE 7-1**.

The potential to reduce impact through the implementation of mitigation measures has also been assessed. The proposed mitigation measures include planting along sections of the Site boundary to screen and filter direct views (as per the Concept Landscape Plan provided at

FIGURE 10-1). In most cases, trees and shrubs take several years to grow to a height that could successfully screen through views. Therefore, the assessment findings at **TABLE 7-1** identifies the projected rating five years following construction – whereby visual impact is reduced to an extent through screen planting.

Assessment of the potential aerial viewpoint is provided at **SECTION 7.2.2.**

TABLE 7-1: ASSESSED VIEWPOINTS AND PREDICTED VISUAL IMPACT LEVELS

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
VP1: **469 Combo Road (Lot 157 DP 754318)** **A photomontage has been prepared for this viewpoint. Refer Section 8.1**	The viewpoint is close to the Site boundary A private home, slightly elevated in relation to the Site, with mostly unimpeded views Likely to see a moderately large area of panels (around 40%) Unlikely to see substation due to lower elevation and creekline vegetation	1km	North-west • Throughout the morning, a rear view of the panels would be seen • During the late afternoon, the front of the panels would be seen	HIGH • Private view in close proximity to the Site boundary • Mostly unimpeded view	MODERATE • Would see large area of land covered by panels • However, panels are low profile (up to 4m high) • Solar farm would be a noticeable part of the view	MODERATE-HIGH	• Screen planting along Seatonville Road is likely to reduce the visual impact. However, trees planted along Seatonville Road may take longer than 5 years to have an effective screening impact due to the slightly lower elevation of Seatonville Road compared to the Site and VP1	MODERATE

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
							• Trees planted along Seatonville Road would reduce views of the closest rows of panels along Seatonville Road • Panels may still be visible in the background; however, screening the closest panels is likely to reduce the visual immediacy of the panels	
VP57: **1148 Mitchell Highway**	Private residence located on western side of a ridge between Site and Mitchell Highway Views mostly directed to the south Less than a quarter of the Site likely to be visible. The southern section of the solar farm most likely to be within view, including the construction compound	1.3km	North-west • View of panels would be angled to south-east and not facing panels directly • Side-on view of the panels	MODERATE • Private views just over 1km away • Restricted view due to landform	MODERATE • The Site is not central in the view or visually prominent	MODERATE	Unlikely	MODERATE

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
	The substation would be unlikely to be seen				• Solar farm likely to be recognisable although not a dominant feature of the view			
VP7: **576 Cobbora Road**	Private residence Has extensive views Almost half of the Site potentially visible Is located close to Cobbora Road which has heavy traffic Unlikely to see substation	1.8km	South-east • Mostly a side-on view of panels • The face of the southernmost panels may be seen	MODERATE • Private view in moderate proximity less than 2km away	MODERATE • Moderate extent of panels seen	MODERATE	• Planting along the eastern Site boundary likely to reduce impact	MODERATE-LOW
Group A: **VP55, VP56, VP58, VP59, VP60, VP74**	Private residences west of Mitchell Highway Wide views to east including Site. Over half of the Site visible (up to 75%) Elevated position in relation to Site Would see panels and substation. Distance varies: 1.5km (VP60), 1.6km (VP58, VP74), 1.75km (VP55), 1.8km (VP59) and 2km (VP56)	1.5 - 2km	West • Would see rear of panels in the morning • Would see face of panels in the afternoon	MODERATE • Private views in moderate proximity up to 2km away • View includes Highway and railway in the foreground	MODERATE • Relatively large extent of view affected • Site is central in the view • However, panels are low profile (up to 4m high)	MODERATE	• Screen planting along Seatonville Road in the vicinity of the substation likely to reduce views to substation	MODERATE-LOW

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
	Would see construction compound. Distance to construction compound is closer (1.3km from nearest residence)				• Solar farm would be recognisable but not prominent			
Group E: **VP49, VP50, VP51, VP52, VP53, VP54, VP75, VP78, VP79**	Private residences on western side of Mitchell Highway Elevated with wide views to east including Site. Almost all of the Site (up to 90%) may be visible Would see construction compound Would see substation Distance varies: 2.2km (VP54), 2.5km (VP53), 2.75km (VP50, VP78), 2.8km (VP52, VP75), 3.1 (VP51) and 3.2km (VP49)	2.2 - 3.2km	West • Would see rear of panels in the morning • Would see face of panels in the afternoon	MODERATE • Wide, mostly unimpeded views • Less than 5km away	MODERATE • Large extent of solar farm potentially seen • Viewer position is elevated • Solar farm would be noticeable, although not dominant	MODERATE	• Views to substation likely to reduce with screen planting	MODERATE-LOW
VP12: **151 Argyle Road**	Private residence on elevated ridge Would see a relatively large proportion of solar farm (up to 50%) Would not see substation	3.2km	South-east • Would see the face of the panels located in the morning • Would have a rear view of panels in the afternoon	MODERATE • Private unimpeded views • in moderate proximity (less than 5km)	MODERATE • The viewer position is elevated • The Site would be a recognisable although distant feature in the view	MODERATE	• Planting along eastern Site boundary likely to reduce impact	MODERATE-LOW

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
VP36: **55 Gibbs Lane**	Private residence approx. 3km from Site boundary, with potential views of panels at 3.4km away (due to landform) Viewpoint is elevated at 380m ASL (solar farm ranges from 320-360m ASL) Approximately half of the Site potentially visible Substation is likely to be obscured by existing vegetation	3.4km	North-west • Would see face of panels at angle in afternoon • Rear of panels in morning	MODERATE • Private views in moderate proximity, mostly unimpeded	MODERATE • Large proportion of Site potentially visible • Viewpoint has extensive views • However, Site is not a main feature of view	MODERATE	Unlikely	MODERATE
VP2: **1480 Mitchell Highway (Lot 2 DP 803536)** **A photomontage has been prepared for this viewpoint. Refer Section 8.2**	The viewpoint is a private home, which is elevated approx. 20m above the Site Has mostly unimpeded views and up to 80% of the Site potentially visible The Site features centrally in the view Unlikely to see substation due to lower elevation adjacent creekline	3.5km	West • During the afternoon, the face of panels would be seen • Throughout the morning, the back of the panels would be seen	MODERATE • Private, unimpeded views less than 5km away	MODERATE • The viewer position is elevated • A large proportion of solar farm likely to be seen	MODERATE	• Screen planting along Seatonville Road may take longer than 5 years to have a screening impact due to elevation • Proposed tree planting is likely to reduce visual impact of Proposal by a minor extent due to the elevation of this viewpoint	MODERATE

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
							• Proposed tree planting is likely to screen only the rows of panels closest to Seatonville Road. Panels would still be seen in the background	
VP10: **112 Maryvale Road**	Private residence close to Maryvale Road, located on lower lying land near creekline Is the closest private viewpoint to the solar farm Located less than 500m south of the nearest proposed solar panels Elevated land north of the creekline limits potential views of the solar farm Very small area of panels likely to be visible (up to 5%) Possibly the first and second rows of panels (approximately 180m) on top of ridge north of the viewpoint Substation would not be seen	500m	South • Would see down the rows of panels • May notice differing colours of panels from the one viewpoint	MODERATE • Private views in close proximity • However, extent of views restricted by landform and intervening vegetation	LOW • Extent of area affected in view is small • The ridge where panels would be seen is not a focal point from the residence	MODERATE-LOW	• Screen planting along the southern Site boundary near the top of the ridge likely to reduce views of the panels	LOW

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
VP Combo Road	Linear viewpoint Exposure to Site increases and decreases with movement along the Road Almost all of the Site would be visible, although not all at one time At its closest point, panels would be 175m away Substation likely to be seen from some points along the road	175m	Ranges from north-west to north-east • When travelling east, the face of the panels would be seen in the morning and the rear of the panels seen in the afternoon • When travelling south and west, a side-on view of the panels would be seen	LOW • Public views to a small number of road users	MODERATE • Site is not central to the view • Views are temporary	MODERATE-LOW	Unlikely	MODERATE-LOW
VP Mitchell Highway **A photomontage has been prepared for this viewpoint. Refer Section 8.3**	The Mitchell Highway is a linear viewpoint Distance varies. Is approximately 1.1km from the Site at its closest point View from the Highway is wide. Almost all of the Site would be visible for a brief period, although not all at one time	1.1km	Ranges from north-west to south • Side-on view of the panels would be seen when travelling north	MODERATE • Accessed by a large number of people • Major entry to Wellington and tourist route	LOW • The Site is to the side of the view and not a focal point or central to the view	MODERATE-LOW	• Screening along the western Site boundary (Seatonville Road) is likely to reduce views to the substation	LOW (applies to some sections of Mitchell Highway. More elevated sections of the Highway would remain as MODERATE-LOW)

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
	Main Western Railway runs between Highway and the Site Exposure to Site increases and decreases with movement along the Highway Substation likely to be seen from some points along the Highway Construction compound would be visible Colour changes from seeing a side-on view of the panels while the viewer is moving are possible, although distant		• When travelling south, in the morning, the back of the panels would be seen, during the late afternoon, the face of the panels would be seen		• Views are transient and occur temporarily as travellers move along the Highway • Not all of the Proposal would be seen at one time		• From some locations on the Highway, proposed planting would reduce visual impact by screening views of the Proposal • From more elevated sections of the Highway, proposed planting would only reduce visual impact by a minor extent. • From the elevated locations, tree planting is likely to screen only the rows of panels closest to Seatonville Road. Panels would still be seen in the background	

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
VP62: **1003 Mitchell Highway**	Private residence west of Mitchell Highway Would see very little of the Site (up to 10%) due to landform and vegetation Would see construction compound which would be closer than panels at 1.3km away Unlikely to see substation	1.5km	South-west • Would see panels side-on	MODERATE • Private views in moderate proximity	LOW • The site is not visually prominent from this viewpoint • Viewer would see a small portion of the solar farm	MODERATE-LOW	Unlikely	MODERATE-LOW
VP6: **801 Cobbora Road**	Private residence It is possible that a very small section of the solar farm (approximately 5%) would be seen. The eastern-most panels along Baker's Lane would be visible if the panels extend to the top of the ridge Substation would not be visible	1.7km	East • If seen, the face of the panels would be visible in the morning • The back of the panels would be visible in the afternoon	MODERATE • Private view in moderate proximity • However, views are limited	LOW • Very small extent seen • Site is elevated above the viewer	MODERATE-LOW	• Screen planting on the eastern Site boundary likely to reduce impact	LOW
VP13	Private residence Would see a small area of panels (5-10%) Views limited due to elevation and intervening vegetation	2.3km	East • Would see the face of the panels located in the morning	MODERATE • Private views less than 5km away • Limited extent of view	LOW • Small extent of panels seen • Site is not prominent in the view	MODERATE-LOW	• Screen planting along the eastern Site boundary likely to reduce impact	LOW

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
			• Would have a rear view of panels in the afternoon					
Group C: **VP72, VP73**	Private residences Views directed to the south, away from the Site May see a small area of panels due to elevation (up to 20%) May see construction compound View of substation unlikely Distance from Site varies: 2km (VP73) and 2.4km (VP72)	2 – 2.4km	West • Would see the rear of the panels located in the morning • Would see the face of panels in the afternoon	MODERATE • Private views less than 5km away • Limited extent of view	LOW • Small extent of panels seen • Site is not prominent in the view	MODERATE-LOW	Unlikely	MODERATE-LOW
Group B: **VP64, VP65, VP66**	Private residences west of Mitchell Highway Wide views to east including Site Would see up to 50% of the Site Would see panels and substation Would see construction compound Distance varies: 2km (VP64), 2.3km (VP65) and 2.5km (VP66)	2 - 2.5km	South-west • Mostly a side-on view of panels	MODERATE • Private view in moderate proximity (up to 2.5km away)	LOW • Small extent of view affected • Site does not feature centrally in the view • Solar farm may be recognisable, although not prominent	MODERATE-LOW	• Screen planting along Seatonville Road at the location of the substation likely to reduce views to substation	LOW

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
Group D: **VP29, VP30**	Private residences on elevated land Residences provide wide views. However, very little of the Site (approximately 5%) is within the view Distance varies: 2.6km (VP29) and 2.9km (VP30	2.6 - 3km	North-east	MODERATE • Private views less than 5km away	LOW • Viewer would see a very small extent of area afffected	MODERATE-LOW	• Screen planting along the eastern Site boundary likely to reduce views to panels	LOW
VP5: **847 Combo Road**	Private residence elevated above Site Viewpoint is within 2km of the Site boundary, however, the closest view of the panels would be 2.75km away due to landform and vegetation Landform and vegetation restricts the extent of Site potentially visible to approximately 30% Panels likely to be seen beyond nearby ridges and intervening vegetation Unlikely to see substation	2.75km	North • A side-on view of panels would be seen • May notice differing colours of panels from the one viewpoint	MODERATE • Private residence in moderate proximity (less than 5km away)	LOW • The viewer position is elevated • However, the Site unlikely to be visually prominent in the view • Proposal would not be a dominant feature of the scene	MODERATE-LOW	Unlikely	MODERATE-LOW
Group F: **VP67, VP68, VP69, VP70**	Private residences on western side of Mitchell Highway Viewer position is elevated with wide views to north-east including Site Up to 80% of the Site visible Would see construction compound	2.9 – 3.3km	South-west • Mostly a side-on view of panels	MODERATE • Wide, mostly unimpeded views • Less than 5km away	LOW • Relatively small extent of total view affected	MODERATE-LOW	Unlikely	MODERATE-LOW

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
	Would see substation Distance varies: 2.9km (VP69), 3km (VP67), 3.2km (VP70) and 3.3km (VP68)				• Solar farm may be recognisable although not prominent			
Group G: **VP40, VP42, VP43, VP44, VP46, VP48**	Private residences west of the Mitchell Highway Wide views available Over half of the Site (up to 75%) potentially visible Unlikely to see substation Possibly see construction compound Distance from Site varies: 3.2km (VP48), 3.6km (VP44), 3.7km (VP43), 3.8km (VP42), 4km (VP46) and 4.6km (VP40)	3.2 - 4.6km	West • During the afternoon, the face of panels would be seen • Throughout the morning, the back of the panels would be seen	MODERATE • Private views less than 5km away • Site features in view beyond Mitchell Highway	LOW • Although a large proportion of the Site potentially visible, the Site comprises a relatively small area of view available	MODERATE-LOW	Unlikely	MODERATE-LOW
VP Phillipsons and Twiggs Roads	Phillipsons Road and Twiggs Road are unsealed public roads carrying local traffic Traffic loads are light and road users are in transit Some tall trees along the road reserves, however, there are wide views to the east including the Site Exposure to Site increases and decreases with movement along the roads. Almost all of the Site would be visible for short periods, although not all at one time	1.1km	South-west	LOW • Public views for a small number of road users	LOW • Views are temporary • The Site is not a focal point or central to the view • Site would be glimpsed between trees	LOW	• Screening along the western Site boundary (Seatonville Road) likely to reduce views to the substation	NEGLIGIBLE

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
	Substation and construction compound likely to be seen from some points							
VP Cobbora Road	Public road to the west of Site. Linear viewpoint. Distance varies. Is approx. 1.6km from the Site at its closest point Approximately half of the Site may be visible for brief periods, although not all at one time. Exposure to Site increases and decreases with movement along the road. Views are generally only available for an approx. 2km stretch directly west of the Site	1.6km	West • When travelling north or south, viewers would have a side-on view when approaching Site • Viewers would see face of panels when closest to Site	LOW • Public views for a high number of viewers • Views only possible from relatively short section of road	LOW • Site is not central to the view • Small extent of viewing area of road users would be affected	LOW	Unlikely	LOW
VP Tarwong Lane	Linear viewpoint Unsealed public roads carrying local traffic Traffic loads are light and road users are in transit Almost all of the Site would be visible for brief periods, although not all at one time Exposure to Site increases and decreases with movement along the roads	2.4km	West • Would see the rear of the panels located in the morning • Would see face of panels in the afternoon	LOW • Public views for a small number of road users	LOW • Views are temporary • The Site is not a focal point or central to the view	LOW	Unlikely	LOW

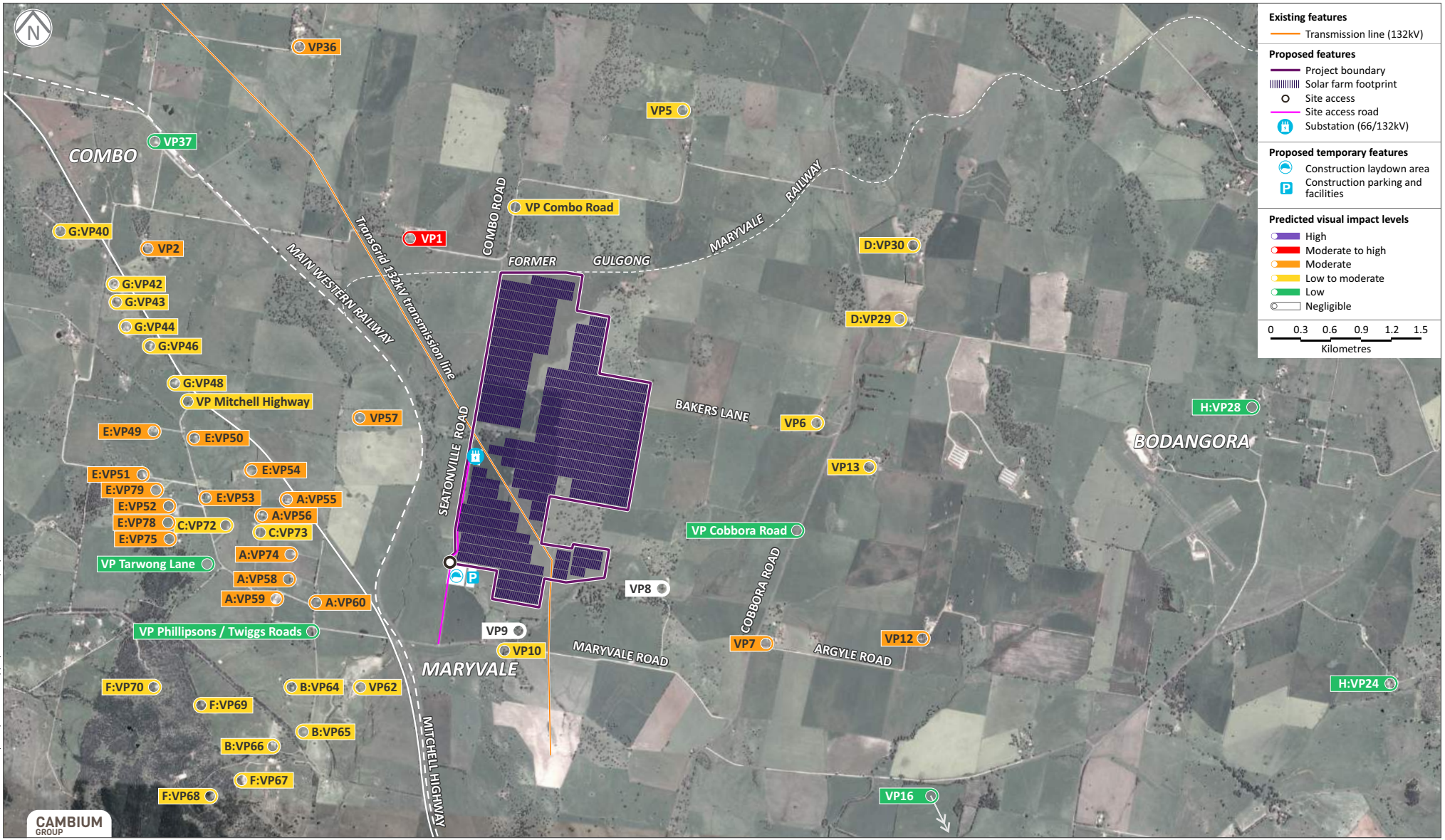
Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
	Substation and construction compound likely to be seen from some points							
VP37: **180 Combo Road**	Private residence located adjacent Main Western Railway line Up to 40% of the Site potentially visible, although at a long distance Substation unlikely to be seen	4 km	North-west • Potentially see face of panels in the afternoon	LOW • Moderate proportion of the solar farm • However, view directed to the north	LOW • Site is not central in the view	LOW	Unlikely	LOW
VP16	Private residences on elevated land with wide views Possible that approximately 30% of the solar farm potentially visible, although very distant	6.2km	South-east • Face of panels not directed to viewer • Location of panels would be generally dark	LOW • Private views over 5km from Site	LOW • The Site is not distinct within the view	LOW	Unlikely	LOW
Group H: **VP24, VP28**	VP24 is a private residence on elevated land with wide views VP28 is representative of the residences at Bodangora, which are also on elevated land with wide views The Site is visible, however, is not prominent at this distance	6 – 7.7km	East • Panels may be seen as white in morning and dark in the afternoon	LOW • Private views over 5km from Site	LOW • The Site is not visually prominent within the view	LOW	Unlikely	LOW

Viewpoint (VP)	Analysis	Distance to nearest panels seen (approx.)	Viewer position in relation to panels seen	Sensitivity (criteria in TABLE 2-1)	Magnitude of change (criteria in TABLE 2-2)	Impact level (Criteria in TABLE 2-3)	Could landscape screening reduce impact?	Revised impact level with screen planting (5+ years post construction)
	It is possible that the solar farm would be seen, although very distant Distance varies: 6km (VP28) and 7.7km (VP24)							
VP8: **265 Maryvale Road**	This residence is owned by the prospective leaseholder of the solar farm. Hence this viewpoint is not considered further in this report.	650m	N/A	N/A	N/A	N/A	N/A	N/A
VP9: **121 Maryvale Road**	This residence is owned by the prospective leaseholder of the solar farm. Hence this viewpoint is not considered further in this report.	275m	N/A	N/A	N/A	N/A	N/A	N/A

FIGURE 7-1

Predicted visual impact levels for identified viewpoints

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT



7.2.2 Aerial viewpoint

Wellington airport is within 3km of the Site. There could be views of the Proposal from aircraft accessing the Airport. Wellington Airport does not support commercial flights and is primarily used for private light aircraft.

There are other large-scale industrial-type facilities in the area that would be seen from the air (such as Wellington Correctional Centre and intensive poultry farm sheds – both located north east of Wellington). There are also approved wind and solar energy facilities – Bodgandora Wind Farm and Wellington Solar Farm. Wellington Solar Farm, in particular, would be of a similar scale to the proposed solar farm.

Some airborne viewers may find a solar (PV) farm interesting to look at - others may feel it reduces the quality of local landscape character. From an airplane, the proposed and approved solar farms are most likely to appear dark in colour, similar to shadowing and vegetation, and have a similar dark-colour to that of the Mount Arthur Range, although be significantly smaller in scale.

7.3 Summary of results to viewpoints

In summary, the assessment of impact to viewpoints finds there are 47 private viewpoints with potential views of the proposed PV solar farm, and five public, linear viewpoints. The single axis tracker system with slow moving panels would result in changing angles and colours seen throughout the day. Exposure to the face of the panels would be shorter in duration in comparison to fixed angle panels that did not move to follow the sun.

Ratings are summarised below:

- One private viewpoint with a **moderate-high** impact: VP1
    - This residence is approximately 1km from the Site
    - Has mostly unimpeded views, and
    - Would see a large proportion of the solar farm
- 20 private viewpoints with a **moderate** impact: VP2, VP7, VP12, VP36, VP49, VP50, VP51, VP52, VP53, VP54, VP55, VP56, VP57, VP58, VP59, VP60, VP74, VP75, VP78, VP79
    - These residences are within 3.5km of the Site
    - Have wide views including the Site
    - Viewer position was generally elevated, and
    - Would see a large proportion of the solar farm.
- 22 private viewpoints with a **low-moderate** impact: VP5, VP6, VP10, VP13, VP29, VP30, VP40, VP42, VP43, VP44, VP46, VP48, VP62, VP64, VP65, VP66, VP67, VP68, VP69, VP70, VP72, VP73
    - These residences have restricted views of the Site
    - Or see a relatively small proportion of the Site
    - They would see a small area of solar farm

    - Or, the solar farm would encompass only a small area of the view available.
- Four private viewpoints with a **low** impact: VP16, VP24, VP28, VP37
    - The Site was not distinct from these residences or central to the view
    - Included residences over 5km from the Site, and
    - Viewpoints that would only view a small extent of the solar farm.
- Two public road corridors with a **moderate-low** impact: VP Mitchell Highway and VP Combo Road
- Three public road corridors with a **low** impact: VP Cobbora Road, VP Tarwong Lane, VP Phillipsons/Twiggs Roads
- Visual impact from the air has been assessed as **low**.

Following the anticipated growth and screening effects of proposed mitigation planting, for some private viewpoints the impact rating would reduce so that there would be:

- Four private viewpoints rated moderate,
- 31 private viewpoints rated moderate-low, and
- Remaining private viewpoints rated low.

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8 Photomontages

Photomontages included in this report have been independently prepared by, and verified by, Cambium Group.

Photomontages have been prepared for VP1, VP2 and VP Mitchell Highway and illustrate the predicted view at a momentary point in time. It is not feasible to illustrate all views. Two private viewpoints have been selected to represent the highest assessed visual impact levels (VP1 was assessed as moderate-high and VP2 was assessed as moderate). VP Mitchell Highway was selected as it represents public views and is also representative of the large number of residences located west of the Highway.

A plan showing the location of photomontage viewpoints is shown at **Figure** 8-1**.** For each viewpoint, three images are provided:

- The existing view toward the Proposal
- Analytical - using the same image as the existing view, the analytical image shows the location of the proposed solar farm in pink
- Photomontage - this image shows the likely view following construction of the proposed solar farm.

A brief description of each viewpoint is provided below. The photomontages illustrating the view from each viewpoint are consolidated at the end of this section.

8.1 Viewpoint 1 (VP1)

VP1 is a private residence approximately 1km north-west of the Site boundary. It is one of the closest residences to the proposed solar farm. There are direct views from the VP1 over the Site.

Images from VP1 (469 Combo Road) are shown at **Figure 8-2, Figure 8-3** and **Figure 8-4.** The images were taken from Combo Road reserve, directly in front of the VP1 property, 23 November 2017. The photomontages illustrate the predicted summer morning view (approximately 8:30am).

The assessment findings are presented at **TABLE 7-1**. The visual impact level, without landscape screening, was assessed at moderate-high. This was the highest impact rating assessed as a result of the solar farm.

The viewpoint is relatively close to the Site, is slightly elevated, has mostly unimpeded views, and can view a moderately large proportion of the Site. A large area of the PV solar farm is likely to be seen. The substation is unlikely to be seen.

Screen planting along Seatonville Road has been proposed. However, Seatonville Road is at a lower elevation compared to the solar farm, it is likely that screen planting would require longer than five years to reach a sufficient height to be seen from the residence.

Although the screening function of proposed planting may take longer than five years to be effective, the visual impact with mature screen planting is likely to reduce. Trees planted along Seatonville Road are likely to reduce views of the closest rows of panels along Seatonville Road, reducing the extent of the solar farm seen and the close appearance of the panels. Panels would still be seen in the background. The low-profile panels are likely to appear as a dark, shadow-like colour. They would be noticeable, but not a prominent feature within the landscape.

With mitigation, the visual impact is assessed to reduce to moderate.

8.2 Viewpoint 2 (VP2)

VP2 is a private residence approximately 3.5km west of the Site boundary. Although this residence is further away, it is approximately 20m higher in elevation than the Site and has direct views of the property.

Images of VP2 (1480 Mitchell Highway) are shown at **Figure 8-5**, **Figure 8-6** and **Figure 8-7.** The images were taken from the intersection of Grangeview Lane and Gravel Pit Lane (the nearest public access to VP2), 23 November 2017. The photomontages illustrate the predicted summer afternoon view (approximately 2:30pm).

The assessment findings are presented at **TABLE 7-1**. The visual impact level, without landscape screening, was assessed at moderate. The viewpoint has mostly unimpeded views and can view the majority of the Site. A large area of the PV solar farm could potentially be seen. However, due to the distance of the viewpoint from the Site, the panels would not be distinct, and the substation is unlikely to be seen.

Screen planting along Seatonville Road has been proposed. However, Seatonville Road is at a lower elevation compared to the solar farm and the viewpoint, and it is likely that screen planting would require longer than five years to reach a sufficient height to provide an effective screening function.

Proposed tree planting at maturity is likely to reduce visual impact by a minor extent due to the elevation of this viewpoint. Proposed planting is likely to screen only the closest rows of panels to Seatonville Road. A large extent of panels would still be seen in the background. The low-profile panels are likely to appear as a dark, shadow-like colour. They would be noticeable, but not a prominent feature within the landscape.

With mitigation, the visual impact is assessed to remain as moderate.

8.3 VP Mitchell Highway

VP Mitchell Highway is a linear viewpoint east of the Site. Proximity and exposure to the Site changes as the road user travels along the Highway. The Highway is approximately 900m from the Site at its closest point.

Images of VP Mitchell Highway are shown at **Figure 8-8, Figure 8-9** and **Figure** 8-10**.** The images were taken from the intersection of Tarwong Lane and the Mitchell Highway, 13 February 2018. The photomontages illustrate the predicted summer morning view (approximately 10:45am). At the intersection of Tarwong Lane and the Mitchell Highway, the Site is over 2km from the eastern side of the Highway. This is one of the more elevated sections of the Highway and represents a worst-case scenario from this linear viewpoint.

The assessment findings are presented at **TABLE 7-1**. The visual impact level, without landscape screening, was assessed at moderate-low. The Highway is accessed by a large number of people and the view from the Highway is at times very wide, although changes as the road user moves throughout the road corridor.

A large area of the PV solar farm could potentially be seen, however, would be visible for only brief periods of time. The panels would appear as a dark, shadow-like colour and the substation may be seen from some points along the Highway.

Screen planting along Seatonville Road has been proposed. Mature planting would have the most impact in screening views to the substation, the tallest element of the proposal. From some points along the Highway, particularly those similar in elevation to the Site, views of the Proposal are likely to be screened by proposed planting. However, from more elevated sections of the Highway, screen planting is likely to be less effective. At those locations, proposed tree planting is likely to screen only the rows of panels closest to Seatonville Road. A large area of panels would still be seen in the background.

As mitigation is likely to be effective and reduce visual impact along some sections of the Mitchell Highway, the visual impact with mitigation is assessed to reduce to low.

FIGURE 8-1

Photomontage locations

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

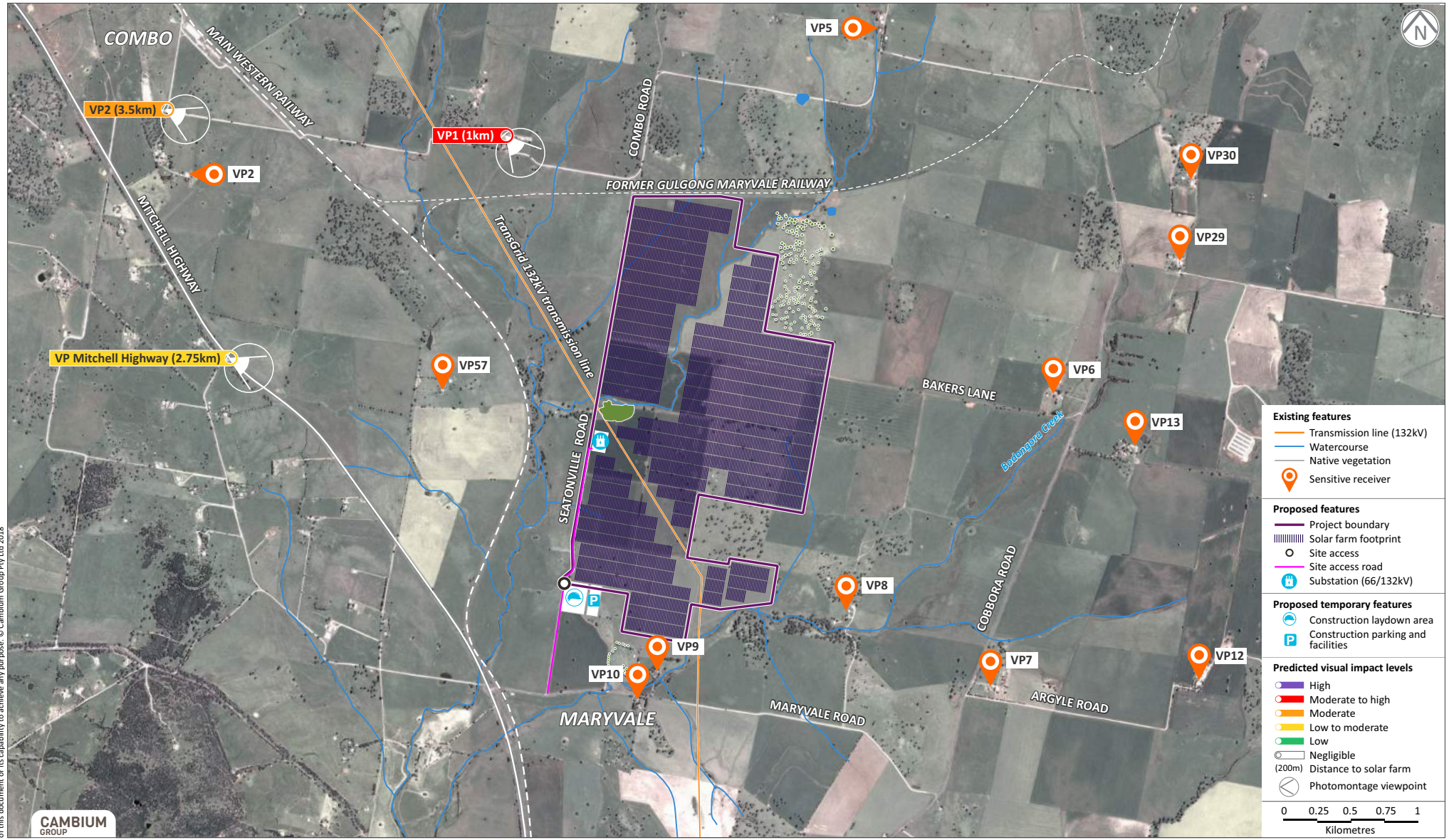

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FIGURE 8-2

VP1 - Existing view

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

CAMBIUM GROUP

031146_Mar_F8-2_to_F8-7_180625_v01

FIGURE 8-3

VP1 - Analytical view of likely visibility of Proposal

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

CAMBIUM GROUP

031146_Mar_F8-2_to_F8-7_180625_v01

FIGURE 8-4

VP1 – Photomontage of likely view of proposal post construction

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

031146_Mar_F8-2_to_F8-7_180625_v01

FIGURE 8-5

VP2 – Existing view

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

031146_Mar_F8-2_to_F8-7_180625_v01

FIGURE 8-6

VP2 - Analytical view of likely visibility of Proposal

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

FIGURE 8-7

VP2 – Photomontage of likely view of Proposal post construction

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

FIGURE 8-8

VP Mitchell Highway - Existing view

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

031146_Mar_F8-2_to_F8-7_180625_v01

FIGURE 8-9

VP Mitchell Highway - Analytical view of likely visibility of Proposal

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

FIGURE 8-10

VP Mitchell Highway - Photomontage of likely view of Proposal post construction

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT

031146_Mar_F8-2_to_F8-7_180625_v01

10 Mitigation

This section of the report specifies mitigation measures to avoid, reduce, or compensate for the visual impacts of the Proposal.

10.1 Best practice

Visual impact mitigation for the PV solar farm includes a range of measures that could be undertaken to avoid, reduce or compensate for potential impacts. The following is a list of best practices applicable to PV solar facilities when considering potential mitigation options[22]:

1. Minimise impact through use of design features (refer also to 'vegetation screening' in sidebar at **SECTION 10.3**)
2. Minimise and repair ground disturbance
3. Site facilities away from most prominent land features (locate in less prominent locations and away from focal points)
4. Avoid night sky impacts
5. Site facilities in already disturbed landscapes or clearings
6. Increase distance to reduce visual dominance
7. Use site-specific location and topographic features to reduce visibility
8. Use colour to reduce contrast
9. Monitor visual impacts.

10.2 Existing measures and proposed mitigation

The Proposal already features a number of elements that serve to mitigate potential landscape character and visual impacts to key viewpoints. **TABLE 10-1** lists the best practices, the positive features of the Proposal, and additional mitigation measures which are recommended to achieve the reduced landscape character and visual impact ratings determined in this report.

[22] Adapted from Apostol, D. 2017 (180)

TABLE 10-1: MITIGATION MEASURES

Best-practice	Existing positive measures within the Proposal	Additional measures recommended
1. Minimise impact through use of siting and design features	- The proposed solar farm has been located in a rural area with a small local population, and limited visual exposure - The Site is not visually prominent - The Site is located along a local road generally only accessed by residents and local property owners - The solar farm has a low profile with panels a maximum height of 4m above the ground - The surface of the panels would be non-reflective - The substation would be located within a lower elevated area of the Site, with limited exposure to private residences, and with existing vegetation for screening	Prior to construction: - A Concept Landscape Plan has been prepared (refer to - **FIGURE** 10-1) to provide screening where likely to reduce visibility. The plan has been adapted to the local topography and viewpoints, and discussed with affected landowners during consultation. - Prior to construction, seek feedback from Dubbo Council and develop a Detailed Landscape Plan. Nominate vegetative screening plant species and planting details in the Detailed Landscape Plan. - Check vegetative screening plans with bushfire study currently being prepared for the Proposal and local authorities (if relevant) to reduce potential for fire risk by introducing an additional fuel source. Construction: - Group ancillary facility structures where possible to minimise sprawl. - Stabilise new access road within the Site required for operations. Operation: - Do not install commercial messages, or large-scale signage. Signage required at the Site should be of sufficient size to be readable at driver height within short range (0-20m) and contain only information sufficient for basic facility and company identification, for safety, navigation, and delivery purposes. - Keep Site tidy and neat, remove weeds, and undertake necessary repairs.
2. Minimise and repair ground disturbance	- The Proposal is located within an area already mostly cleared of trees	Construction:

Best-practice	Existing positive measures within the Proposal	Additional measures recommended
	- The Proposal would require minimum cut and fill - Trenches for cabling would be backfilled as soon as possible - Installation of the panels are on pile driven mounts, foundations are not required.	- Minimise grading across the Site and undertake the minimum levelling necessary to install panel supports. Do not bench the Site. - Rehabilitate exposed ground surfaces as soon as possible. - Implement dust and wind erosion controls to avoid visual issues associated with dust. E.g.: water cart on site; avoid ground disturbance on high wind days; water exposed surfaces; cover stockpiles. - Implement erosion and sediment controls to avoid visual issues associated with erosion and water pollution.
3. Site facilities away from most prominent land features (locate in less prominent locations and away from focal points)	- The Proposal would avoid waterways and existing vegetation where possible. - A buffer of 40m would be provided between infrastructure and any waterway. - A 10m minimum buffer would be provided from the Site boundaries. - The footprint would also avoid the majority of tall woody vegetation present on the site. - The substation is proposed to be located in a low-lying area of the Site, with limited exposure	
4. Avoid night sky impacts	- The Proposal would not be operated at night. Lighting of the site at night is not required, and is not anticipated unless in emergency situations	Operations: - Undertake maintenance activities (such as cleaning the panels and other routine tasks) during daylight hours. - Use amber lighting if lights are required, rather than bluish-white lighting.

Best-practice	Existing positive measures within the Proposal	Additional measures recommended
5. Site facilities in already disturbed landscapes or clearings	- The panels and ancillary infrastructure would be generally located in already cleared areas. - Minimal tree clearing is required.	Construction: - Retain existing grass cover beneath solar panels and supports if possible to do so safely, and not interfering with facility management. Decommissioning: - Develop a remediation plan to include the following actions: o recontour, cultivate, seed, and stabilise the majority of disturbed surfaces with pasture grass species following the removal of infrastructure. o re-establish any previously removed native vegetation with appropriate, similar species.
6. Increase distance to reduce visual dominance	- There is a significant buffer (over 1km) between the major linear, public viewpoint (Mitchell Highway) and the majority of private viewpoints - The panels are well set back from the closest residence to the Site (over 1km)	
7. Use site-specific location and topographic features to reduce visibility	- The substation is proposed to be located in a low-lying area of the Site, with limited exposure, and not visible to the residence closest to the Site - Existing vegetation on site would be retained	Construction: - Protect existing vegetation by installing temporary fencing around vegetation areas to be retained and demarcating as a no-go zone. No storage or equipment, stockpiling or disturbance is to occur within the zone.
8. Use colour to reduce contrast		Construction: - Treat the support structures of PV panels and ancillary structures such as inverters, with a non-reflective finish.

Best-practice	Existing positive measures within the Proposal	Additional measures recommended
		- Paint or colour-treat facility components to better match the surroundings and decrease their visibility and contrast. Choose a colour two to three shades darker than the background colour. Dark grey is generally considered a good colour for ancillary infrastructure. Do not paint components white unless there is a safety or functional requirement to do so. White is generally the most conspicuous colour. Lighter colours should be avoided. - Test colour selection prior to implementing across the site for visually compatibility and minimal contrast. Assess colours as they would be seen from the most affected viewpoints to determine which colour is more effective blending with the background. - Colour treat grouped structures using the same colour. Use semi-gloss finish rather than flat or gloss finish. - Specify substation to have a low-reflectivity, neutral colour finish. Insulators at substations should be non-reflective and non-refractive. Choose a colour for the substation surfaces two to three shades darker than the background colour. As the substation is located near a line of trees, a deep green or dark grey may be suitable. - Chain-link fences surrounding the substations should have a dulled, darkened finish to reduce contrast. Black or dark grey is generally a suitable colour for substation fencing. Operation: - Keep non-reflective finishes and colour-treated coatings in good repair. Reapply if surface is subject to fading or flaking.
9. Monitor visual impact		Operation: - Periodically contact the nearest residents to the facility to determine if visual issues are being experienced.

Best-practice	Existing positive measures within the Proposal	Additional measures recommended

		- Monitor performance of screen planting areas via a three-year planting maintenance period. Replant as necessary if plants die, and supplement planting with alternative species if plants do not adapt to the Site. Ensure density and growth is satisfactory to achieve screening effect.
		- Record complaints of visual issues.
		- Discuss possible remedies for visual issues with the resident or complainant.
		- Take meaningful action to remedy visual issues. For example:
		  o introduce planting to screen views,
		  o colour treat ancillary site infrastructure, or
		  o install fabric-covered screening fences to reduce views from particular viewpoints.

10.3 Landscape Plan

One of the mitigation measures is screen planting. A Concept Landscape Plan has been provided at

FIGURE 10-1 which identifies strategic locations for perimeter screen planting. General issues regarding planting at solar farms are discussed in the side bar "*Vegetation Screening*" and "*Shading cast by vegetation*".

Vegetation Screening

Vegetation, typically trees, may screen views fully or partially, especially close to the viewpoint*. But in many cases, vegetation is not tall enough to screen views of large-scale infrastructure. Such infrastructure extends over a wide area of land, and, particularly if viewpoints are elevated, vegetation is not sufficient to block or even reduce views. However, in some instances, where elevation is favourable, it would be possible to plant trees of adequate height and density, within a wide planting area, to minimise or even eliminate some views.

* United States Department of the Interior. 2013. *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands.* Bureau of Land Management.

Shading cast by vegetation

Solar farms require maximum exposure to sunlight to generate energy. Screen planting close to the northern, eastern and western sides of a solar farm could shade the panels closest to the planting area during part of the day. The shadow cast in summer would be minimal, however, longer during winter months.

Proposed landscape screening also needs to consider the implications of any bushfire restrictions which could affect the suitability of different types of plant species, screening locations and planting densities.

The Concept Landscape Plan was discussed (in general) with affected property owners during consultation undertaken during 18-19 July 2018 by Pitt & Sherry. Proposed planting as shown on the Concept Landscape Plan did not raise any issues of concern.

Prior to construction, further discussion with landowners would be undertaken if required, and feedback sought from Dubbo Council. A Detailed Landscape Plan would then be developed which would include plant species and planting details.

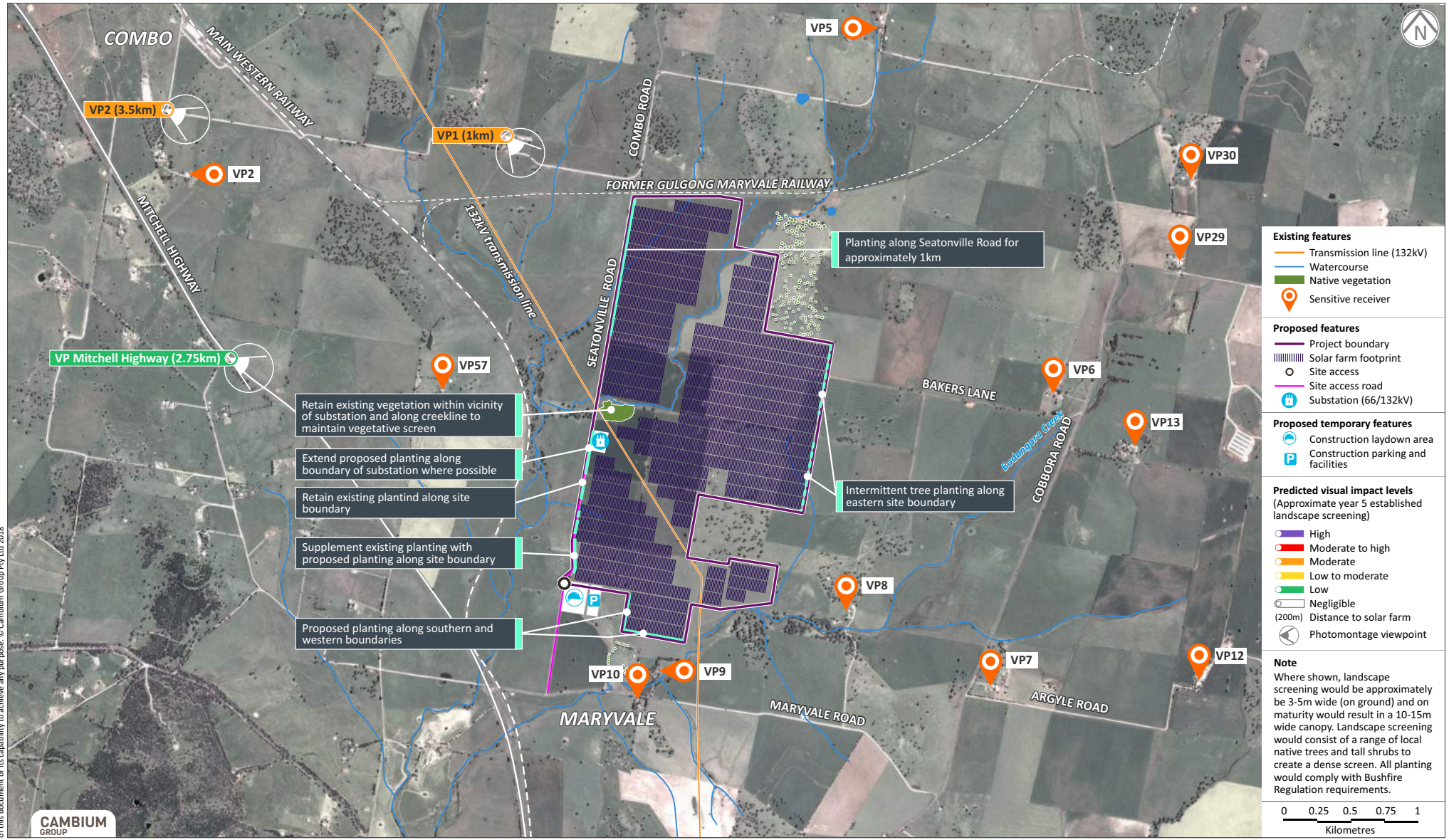
The key features of the Concept Landscape Plan are:

- Planting along some sections of the western Site boundary (Seatonville Road)
- Planting around the substation (within safety constraints)
- Planting along some sections of the eastern Site boundary to reduce visual impact for residents east of the Site
- Planting along some sections of the southern Site boundary to reduce visual impact for residents south of the Site
- All planting would comply with Bushfire Regulation requirements
- In general, planting areas would be approximately 3-5m wide (on ground) and consist of a range of local native trees and tall shrubs to create a dense screen.

FIGURE 9-1

Concept landscape plan

MARYVALE SOLAR FARM - VISUAL IMPACT ASSESSMENT



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11 Cumulative impact

Cumulative visual effects occur as we move through the landscape. The combined effects from the Proposal with other present, and likely future projects or activities, are discussed below.

At noted in **SECTION 3.4,** Wellington Solar Farm is an approved PV solar farm located near the Site. This facility is currently under construction. The Wellington Solar Farm would comprise low-profile, non-reflective solar PV panels and substation similar to the Proposal. It would cover a larger area (at 490ha) than the Maryvale solar farm (at 375ha).

Adjacent to, and north of, Wellington Solar Farm, AGL has proposed Wellington North Solar Plant (approximate 818ha). If this project proceeds, the combined contiguous area of solar panels at this location would be approximately 1308ha. These combined solar farms (referred to hereafter as the Wellington/Wellington North Solar Plant) is approximately 2.2km from the Site and approximately 750m from the Mitchell Highway at its closest point.

Not all residential viewers were identified in the Wellington/Wellington North Solar Plant assessments, particularly those not immediately next to the proposed solar farms, and the impact of views from the Mitchell Highway does not appear to have been assessed[23]. The following discussion then, is based on our review of available information, topographic maps and desk top analysis. A detailed study has not been undertaken.

Local road users would see the Wellington/Wellington North Solar Plant in close proximity when travelling along Cobbora Road and Goolma Road. Based on our understanding of the approved and proposed development, the two roads would form the boundary of the Wellington/Wellington North Solar Plant. Solar panels would extend to the road reserve of both roads and follow the road corridor for a distance of over 5km.

The Proposal would not be seen from Goolma Road and only small areas of the Site would be briefly seen from Cobbora Road. Therefore, the Proposal is unlikely to noticeably increase cumulative visual impact for users of these local roads.

It is possible, however, that road users of the Mitchell Highway could see parts of the Wellington/Wellington North Solar Plant and the Proposal in the same viewpoint. The farms are close (separated by approximately 2km), and the Mitchell Highway provides opportunity for extended views across the landscape at elevated points. For example, at the location of the photomontage for VP Mitchell Highway (refer **Figure** 8-10) it is possible that this view could also include part of the Wellington/Wellington North Solar Plant, although the exact extent cannot be clarified in this report.

[23] Based on a review of available public information on these projects

The cumulative magnitude of change to landscape character may be noticeable from elevated viewpoints along the Mitchell Highway. Although vehicles are travelling at high speeds, and the solar farms would only be seen for a short duration, the Mitchell Highway is a key entry point into Wellington. Some road users may view the change as negative, yet others may consider it as progress in renewable energy and view it less negatively.

Although extensive, the solar farms are low-profile (not more than 4m high panels), are a non-contrasting, non-reflective, dark colour, only part of the solar farms would be seen at any one time, and the farms would only be visible briefly and while in transit.

Further afield, Photon Energy is proposing PV solar farms at Mumbil and Suntop (refer to **FIGURE 3-3**). The proposed Mumbil solar farm (201ha in size) is approximately 36km to the south-east by road. The proposed Suntop solar farm (513ha in size) is located on the western side of the Mount Arthur Reserve, approximately 21km away by road). It would not be possible to see all three of the Proponent's solar farms from a single viewpoint (except possibly from the air). Neither the Mumbil nor the Suntop site is visible from the Site or from the Wellington/Wellington North Solar Plant.

Should all of the proposed PV solar farms be realised[24] the only location within the Wellington area where it may be possible to see more than one solar farm within the same view is the Mitchell Highway (as noted above) at the location west of the Proposal and the Wellington/Wellington North Solar Plant. When driving elsewhere through the Wellington landscape, it would be unlikely, in the normal routine of residents or visitors, to see more than one solar farm within the same day.

With the exception of the Proposal and the Wellington/Wellington North Solar Plant, the locations of the other solar farms are in different directions from Wellington, along routes to different destinations. The other solar farms are separated by driving distances of over 20km, the urban centre of Wellington, and by the major landform of the Mount Arthur Reserve. When driving past each solar farm, the panels would only be in view momentarily.

Considering the physical separation of most of the solar farms and visual characteristics of the PV solar farms (low profile and non-reflective), with the exception of the one location on the Mitchell Highway, the combined effects from the proposed solar farms is unlikely to change the dominant agricultural setting of the physical landscape.

[24] (Maryvale, Mumbil, Suntop and Wellington North, in addition to Wellington Solar Farm that is under construction)

12 Conclusion

The assessment results of Impact to landscape character finds there is a moderate impact.

The assessment results of impact to viewpoints finds that there are no viewpoints with a high impact, however there is:

- One private viewpoint with a moderate-high impact
- 20 private viewpoints with a moderate impact and
- 22 private viewpoints with a low-moderate impact, and
- Two public viewpoints with a low-moderate impact.

Remaining viewpoints have a low impact rating.

When assessing the Proposal against visual impact components of the NSW State Government's draft *Large Scale Solar Energy Guideline*, the result is that the Site is suitable. **TABLE 12-1** lists the key visual factors from the Guideline to be taken into account when considering the likely impact of solar energy developments, together with the findings from this assessment.

TABLE 12-1: APPLICATION OF DRAFT LARGE SCALE SOLAR ENERGY GUIDELINE

Relevant component of Guideline	Visual consideration from Guideline that may assist in minimising localised impacts:	Finding from this assessment
Site selection	▪ Land that does not contain native vegetation or has previously been cleared and utilised for industrial – type purposes (brown field sites) in rural settings	▪ The proposed Site is mostly cleared and within a rural setting. The Site has been used for agricultural purposes. The majority of existing native vegetation would remain on site as part of the Proposal
	▪ Unobtrusive sites with flat, low-lying topography	▪ The proposed Site is generally unobtrusive and low-lying ▪ There are ridges within the Site, however, they are not prominent within the landscape ▪ The Site is exposed to higher elevated residential land to the west, however, most of these residences are over 1.5km away ▪ The tallest element of the solar farm (the substation) would be located near the low lying creekline running through the Site
	▪ Sites with potential to be screened, such as those that can be readily vegetated along boundaries, to reduce visual impacts	▪ Planting along some Site boundaries is possible and has potential to reduce visual impacts. Perimeter screen planting has been proposed

Relevant component of Guideline	Visual consideration from Guideline that may assist in minimising localised impacts:	Finding from this assessment
Site constraints	▪ Sites with high visibility, such as those on prominent or high ground positions ('high visibility or prominence is of particular concern if the solar infrastructure at the site would be juxtaposed against significant scenic, historic or cultural landscape'), or sites which are located in a valley with residences with elevated views looking toward the site	▪ The proposed Site is not on a prominent or high ground position. It does have two ridges within the Site, however, the tallest elements of the solar farm (the substation) would not be located on the ridges ▪ The Site does not comprise and is not near significant scenic, historic or cultural landscape ▪ The proposed Site is not located in a valley. Residences to the west are on higher elevated land, however, most are located over 1.5km away, their view is broad, and the Site comprises a relatively small part of the wider view
Key assessment issues	The visual impact of solar energy development will depend on: ▪ the scale and type of infrastructure,	▪ The proposed infrastructure is low-profile, with a maximum height above ground level of approximately 4m
	▪ the prominence and topography of the site relative to the surrounding environment,	▪ The proposed Site is not prominent relative to the surrounding environment. ▪ Tall structures would not be located on ridges within the Site
	▪ and any proposed measures to screen or otherwise reduce visibility of the site.	▪ A Concept Landscape Plan has been prepared which proposes screen planting ▪ Further mitigation measures have been proposed, such as colour treating ancillary facilities, as set out in **TABLE 10-1**.

This assessment concludes that the proposed Site is generally appropriate for the proposed solar development on visual grounds. The Site is within a rural setting, is generally cleared of native vegetation, is not visually prominent, and has relatively few sensitive receptors viewing the Site. Importantly, the Proposal incorporates a number of key measures that limit potential visual impacts. In particular: the proposed PV solar panels are low-profile and non-reflective; the substation would be located within a low-lying part of the property; and the Site is suitable for screen planting which would reduce exposure of the PV solar panels for some viewpoints over time.

Following the anticipated growth and screening effects of proposed mitigation planting, the impact rating would reduce so that there would be:

- One private viewpoint rated moderate-high
- Four private viewpoints rated moderate
- 31 private viewpoints and two public viewpoints rated moderate-low, and

- The remaining viewpoints would be rated low.

Overall the Proposal appears to represent a moderate and acceptable level of change to the landscape character of the Site and its surrounds. The initial higher number of viewpoints affected are predicted to reduce over time as proposed planting increases in height and is able to reduce the visual impact of the solar farm and the extent seen, and the overall predicted impact level in the longer term is moderate.

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