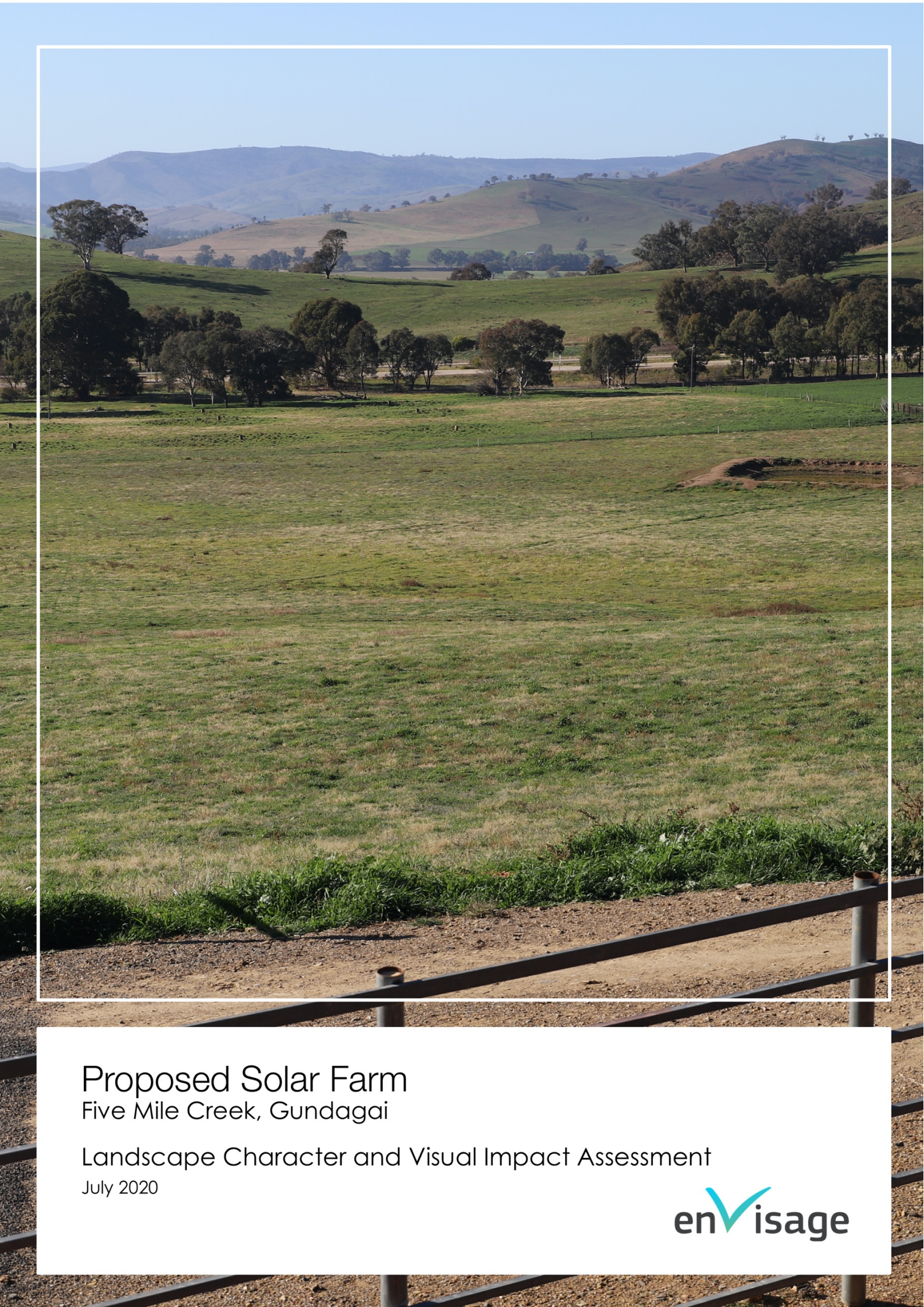

Proposed Solar Farm

Five Mile Creek, Gundagai

Landscape Character and Visual Impact Assessment

July 2020

enVisage

PROPOSED SOLAR FARM

FIVE MILE CREEK, GUNDAGAI

LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

DATE:15 July 2020
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DOCUMENT CONTROL

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1	3 July 2020	Draft for review	Alison Dodds	Stacey Brodbeck
2	15 July 2020	Updated Draft	Alison Dodds	Stacey Brodbeck

Contents

LIST OF FIGURES

LIST OF TABLES

1 Introduction

1.1 Purpose of this report

This visual impact assessment has been prepared to determine the potential landscape and visual impact of a proposed solar farm at Five Mile Creek, Gundagai (the Proposal).

The report has been prepared for the proponent: DPCM Pty Ltd (DPCM).

1.2 Proposal overview

DPCM propose to construct a four (4) megawatt (MW) photovoltaic (PV) solar farm at Lot 8 DP 1244273, Five Mile Creek Road, Gundagai.

The Proposal includes installation of PV solar modules (approximately one metre in height), over 60% of the property (approximately), covering an area of five hectares (5ha) (approximately). Screening vegetation would be planted around the proposed solar modules.

Further detail on the Proposal is provided at SECTION 3.

1.3 Report structure

This report comprises:

SECTION 2	Description of the location
SECTION 3	Description of the proposed development
SECTION 4	Description of the methodology used for this assessment
SECTION 5	The assessment of landscape character and impact
SECTION 6	The assessment of viewpoints and impact
SECTION 7	Recommended mitigation and management actions
SECTION 8	Conclusion.

2 The site

2.1 Location

The Proposal site is a rural property (Lot 8 DP 1244273) at Five Mile Creek Road, Gundagai. The site is approximately 8ha in area and is located approximately 5.5km north of Gundagai, within Cootamundra-Gundagai Regional Council Local Government Area (LGA), NSW. A location plan is shown at FIGURE 2-1.

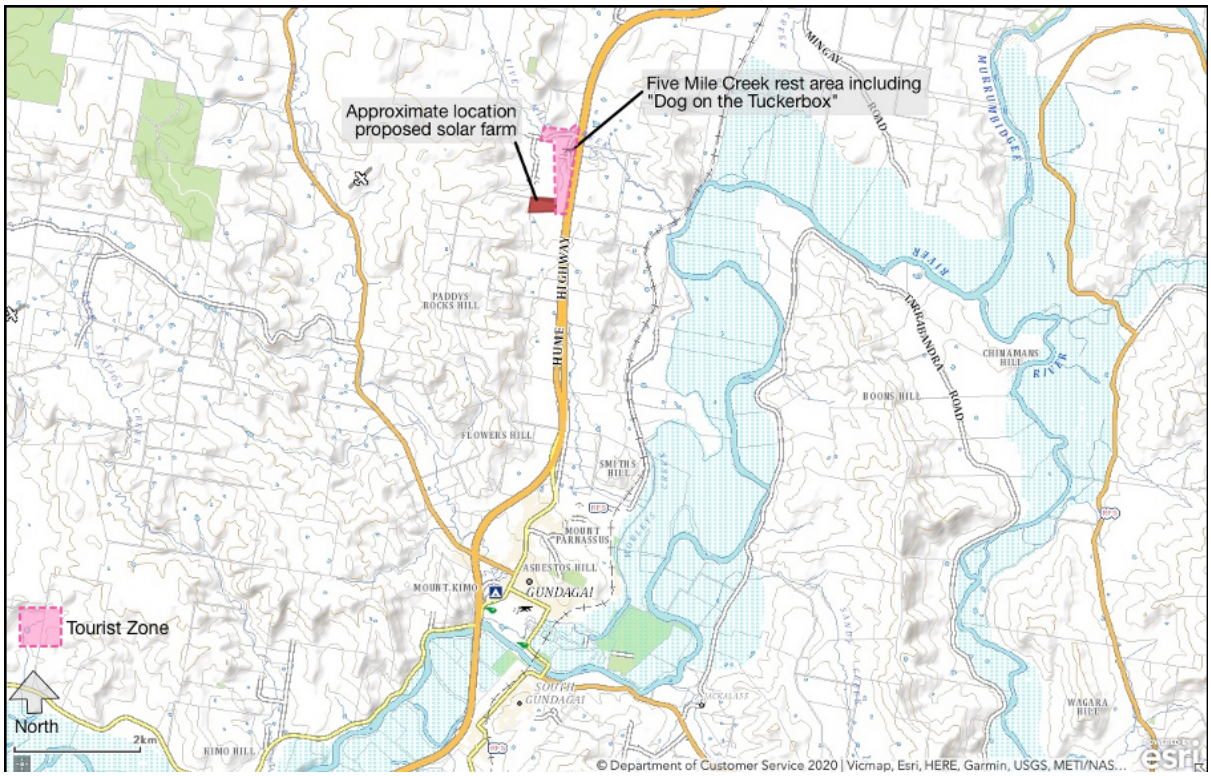


FIGURE 2-1: LOCATION PLAN

The vicinity is generally rural. There is a "tourist" zone adjacent the site to the east, extending along the Hume Highway, known as the "Five Mile precinct". The precinct includes the "Dog on the Tuckerbox" memorial – an item of local Heritage significance (*Gundagai LEP 2011*).

2.2 Description

The site is approximately 150m west of the Hume Highway, and accessed from the Hume Highway via Annie Pyers Drive and Five Mile Creek Road. The site access from Five Mile Creek Road is shown at FIGURE 2-2.

The site is cleared of tall vegetation and covered in pasture grasses. An Essential Energy 22kva overhead transmission line and Transgrid 132kva overhead transmission line pass through the north-western corner of the site. A Crown road reserve traverses the site near the northern boundary.

The eastern portion of the site (closest to the Hume Highway) is generally flat, low-lying and includes a small dam. An image is shown at FIGURE 2-3.

FIGURE 2-2: SITE ACCESS GATE (FIVE MILE CREEK ROAD)

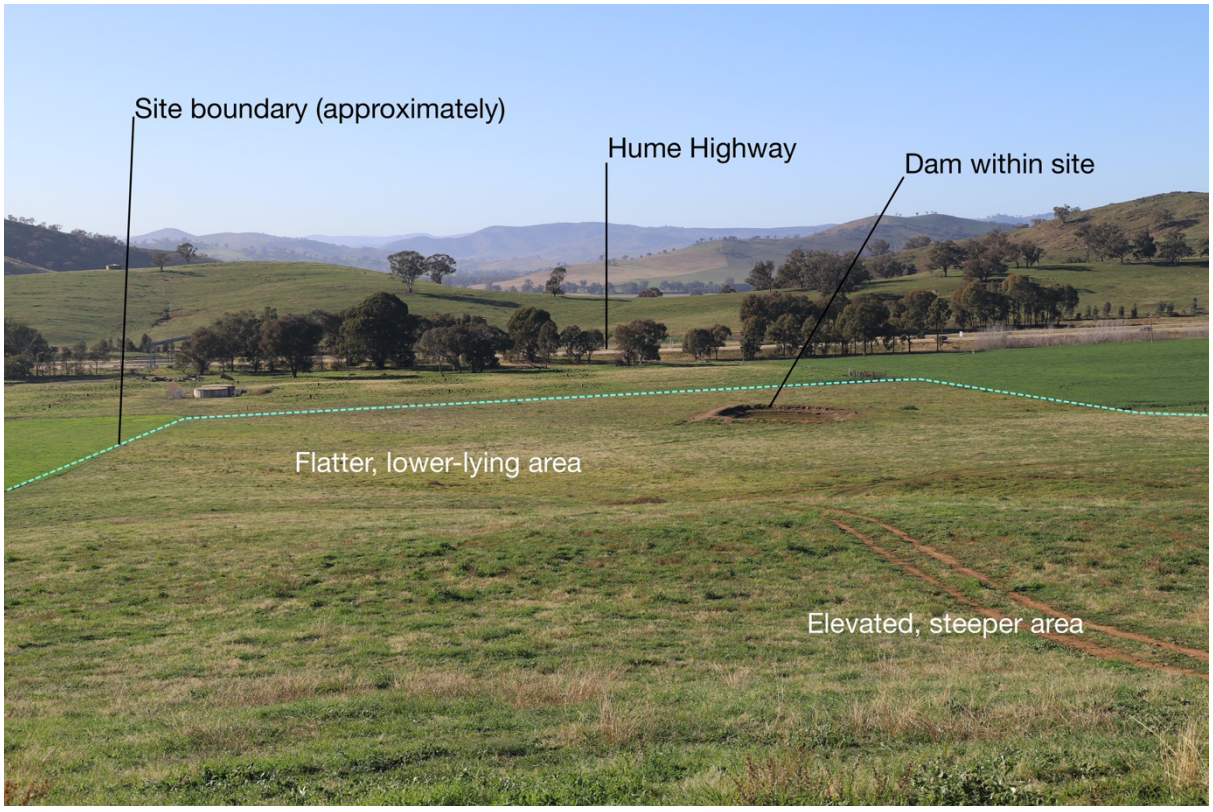


FIGURE 2-3: SITE LOOKING EAST

The western portion of the site is steeper (approximately 1-in-6.5 slope or 15%) and rises approximately 30m above the eastern end of the site. A small gully runs through the site along the base of the steeper land. An image of the western portion of the site is shown at FIGURE 2-4.

A site survey plan is provided at Appendix A.

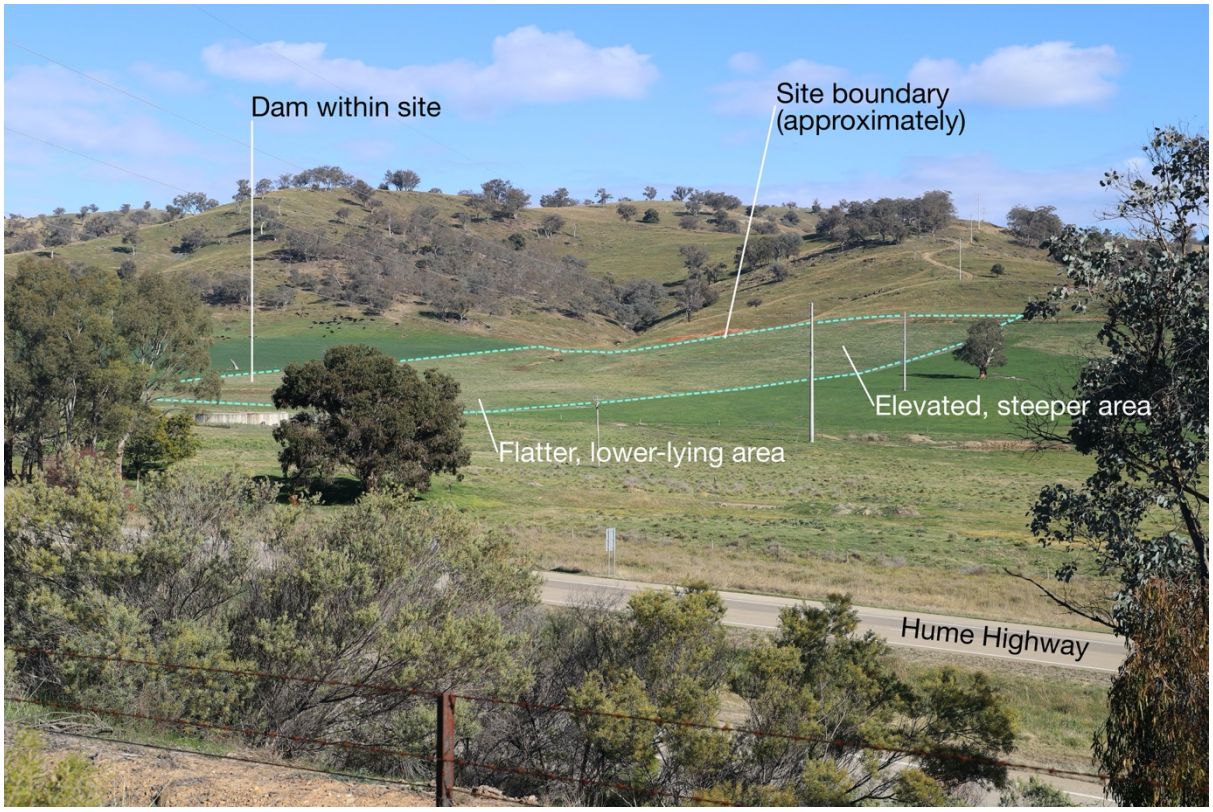


FIGURE 2-4: SITE LOOKING WEST

3 The Proposal

3.1 Overview

The Proposal involves construction of a 4MW PV solar farm over approximately 5ha of the Proposal site (approximately 60% of the property). It would include the installation of:

- solar PV modules
- steel racking and piled supports
- small-scale inverters (possibly housed in an open-sided shelter)
- electrical cabling
- 1 x office for staff use
- 1 x storage container
- 1 x 1000 litre water tank
- 0.55 megalitre dam
- perimeter fencing and
- screen planting.

Energy generated via the proposed solar PV modules would be collected and fed to proposed inverters via cabling and exported to the electrical supply network via the existing Essential Energy 22kva transmission line.

3.2 Layout

All proposed infrastructure would be contained solely within the site.

The solar PV modules would be located over the lower, flatter, eastern portion of the site. The area proposed to be covered by solar PV modules would exclude:

- the dam (which would be retained for water storage on site)
- a 15m wide APZ (asset protection zone) on all site boundaries
- the steeper western portion of the site
- the Transgrid 132kva electricity transmission line easement, and
- the Crown road reserve.

Approval for the closure and acquisition of the Crown road reserve within lot 8 DP1244273 is pending. The solar PV modules would not be installed in the reserve until approval is obtained.

The steeper, western portion of the site may include ancillary structures associated with the solar farm, such as the office/storage container and water tank.

The proposed site plan (provided by DPCM) is shown at FIGURE 3-1.

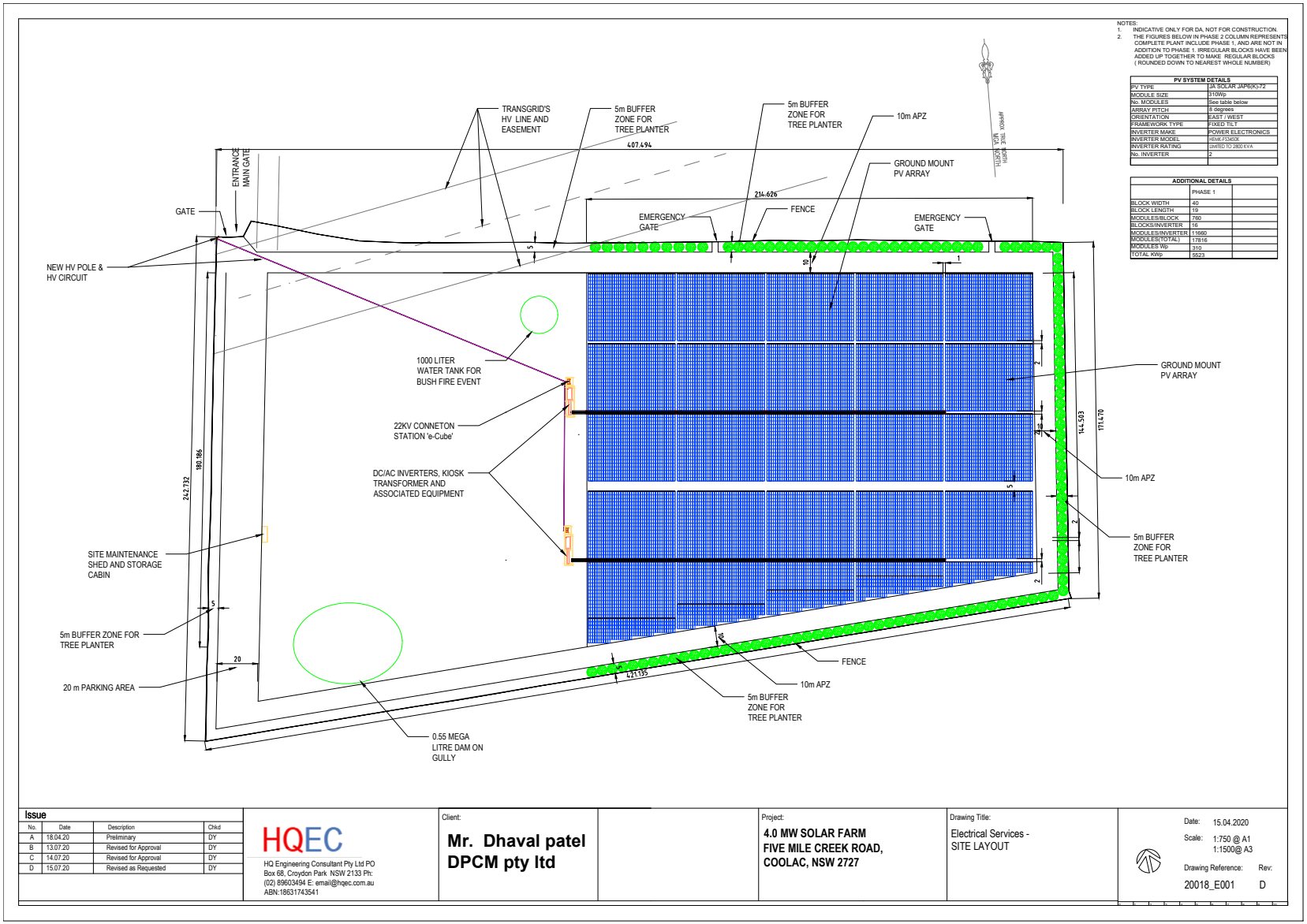


FIGURE 3-1: PROPOSED LAYOUT

3.3 Components

PV modules

Size

The solar farm would use monocrystalline solar PV technology and comprise individual modules (each approximately 1m x 2m in size, and approximately 40mm thick) configured in a mesh.

The modules would be generally arranged into blocks 40 modules wide x 19 modules long, and be mounted a maximum of 1m above ground on steel supports. An image the type of system proposed is shown at FIGURE 3-2. The low height profile of the system is illustrated at FIGURE 3-3.

FIGURE 3-2: EXAMPLE OF TYPE OF SOLAR PV MODULE SYSTEM PROPOSED[1]

[1] Image source: Belectric PEG PV Plant brochure.

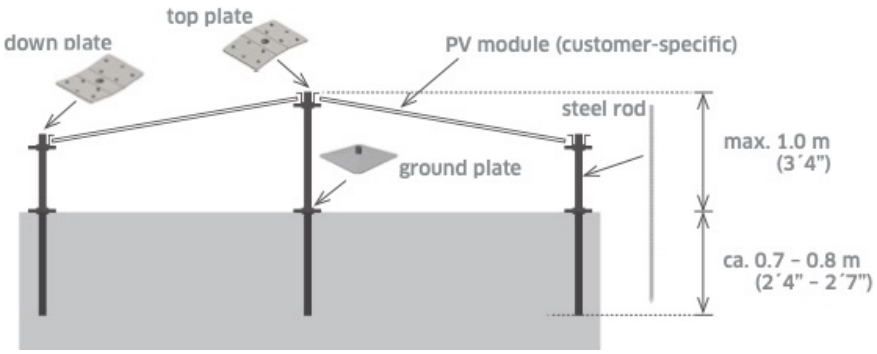


FIGURE 3-3: SOLAR PV MODULE SYSTEM HEIGHT[2]

Installation

Installation does not require site levelling, heavy machines, concrete foundations or cable trenching. The ground surface under the panels would essentially remain unchanged. An image showing the simple structure of the lightweight solar PV module supports is shown at FIGURE 3-4.

FIGURE 3-4: EXAMPLE OF PROPOSED SOLAR PV MODULE SYSTEM SUPPORTS[3]

Colour

The solar PV module material would be dark coloured, with an anti-reflective coating and an aluminium frame. PV modules are designed to maximise light absorption and are non-reflective. 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*

[2] Image source: Belectric PEG PV Plant brochure.
[3] Image source: Belectric PEG PV Plant brochure.

Note: In general, the colour of solar farms appears slightly different depending on viewer position, distance, season, weather and time of day; and ranges from lighter shades (blueish to white) to darker (deep grey or black). The visibility of solar PV modules also depends on the background colour of the landscape, and the extent to which the solar modules contrast (or stand out) against the background. Some images are provided at Appendix B and C to illustrate the general effect of elevation and distance on views of solar farms.

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.

Ancillary structures

Office

One office, approximately 54m^2 in area (40-foot shipping container), would be installed which would be used periodically by staff. It would include amenities (such as a toilet and lunchroom) and an office area. An image of the type of site office proposed (an expandable shipping container) is shown at FIGURE 3-5. It would be dark in colour.

FIGURE 3-5: EXAMPLE OF TYPE OF SITE CABIN PROPOSED[4]

Storage shed

Equipment would be stored at the site in a single 20-foot shipping container.

Inverters

Electrical cabling would connect the PV modules to small inverters housed within an open-sided shelter (or potentially no shelter). An image showing the type of inverters and housing unit proposed is shown at FIGURE 3-6.

FIGURE 3-6: EXAMPLE OF INVERTERS AND SHELTER PROPOSED[5]

[4] Image source: Shanghai AllStar Industrial https://www.allstar-sh.com/product/detail/id/659
[5] Image provided by DPCM Pty Ltd

External connection

The proponent has 'approval in principle' to export energy generated at the site to Essential Energy's 22kva transmission line. Augmentation works (pole and wire electrical connection) would be required to connect to the Essential Energy network.

Water tank

A 1000 litre water tank is proposed to be located on the western portion of the site. Minor earth works may be required to create a flat are for the tank. Water tanks of this size are generally around 2m tall.

Dam

A 0.55 megalitre dam is proposed within the gully on the western portion of the site. Earthworks would be required to shape the dam.

Perimeter Fencing

A 2.1m high mesh fence would be installed along the perimeter of the site for security purposes. The fence posts and other potentially visible components (such as access gates) would be dark in colour.

Note that security fences surround each of the solar farms shown in Appendix B and C, however, the fences are barely visible. Being a narrow, darker feature, perimeter fences tend to recede into the background.

APZ

A 10m wide APZ would be provided around all site boundaries; offset 5m from the perimeter fence along the northern, eastern and southern site boundaries; and offset 20m from the perimeter fence along the western boundary. The offset is required for vehicular access around the perimeter of the site.

Road

Road base would be brought to the site to form an all-weather vehicular access road within the site perimeter.

Planting

Screen planting would be provided within the 5m wide offset along the northern, eastern and southern site perimeter (on the flatter area of the site). Trees would be planted in a single line close to the perimeter fence so that the offset can still be maintained for fire-prevention. A concept landscape plan is provided at FIGURE 3-7.

The planting area would comprise only lower fire risk trees with no shrub undergrowth. Trees would be planted at (approximately) 1m intervals for a length of up to 200m. Every 200m there would be a break in the planting, approximately 20m wide, to minimise bushfire risk.

One possible species suggested for planting is Black Cypress Pine (*Callitris endlicheri*). The species is local to the area and does not have peeling bark (a higher bushfire risk) and does not regularly drop branches (which would make maintenance of the offset more difficult).

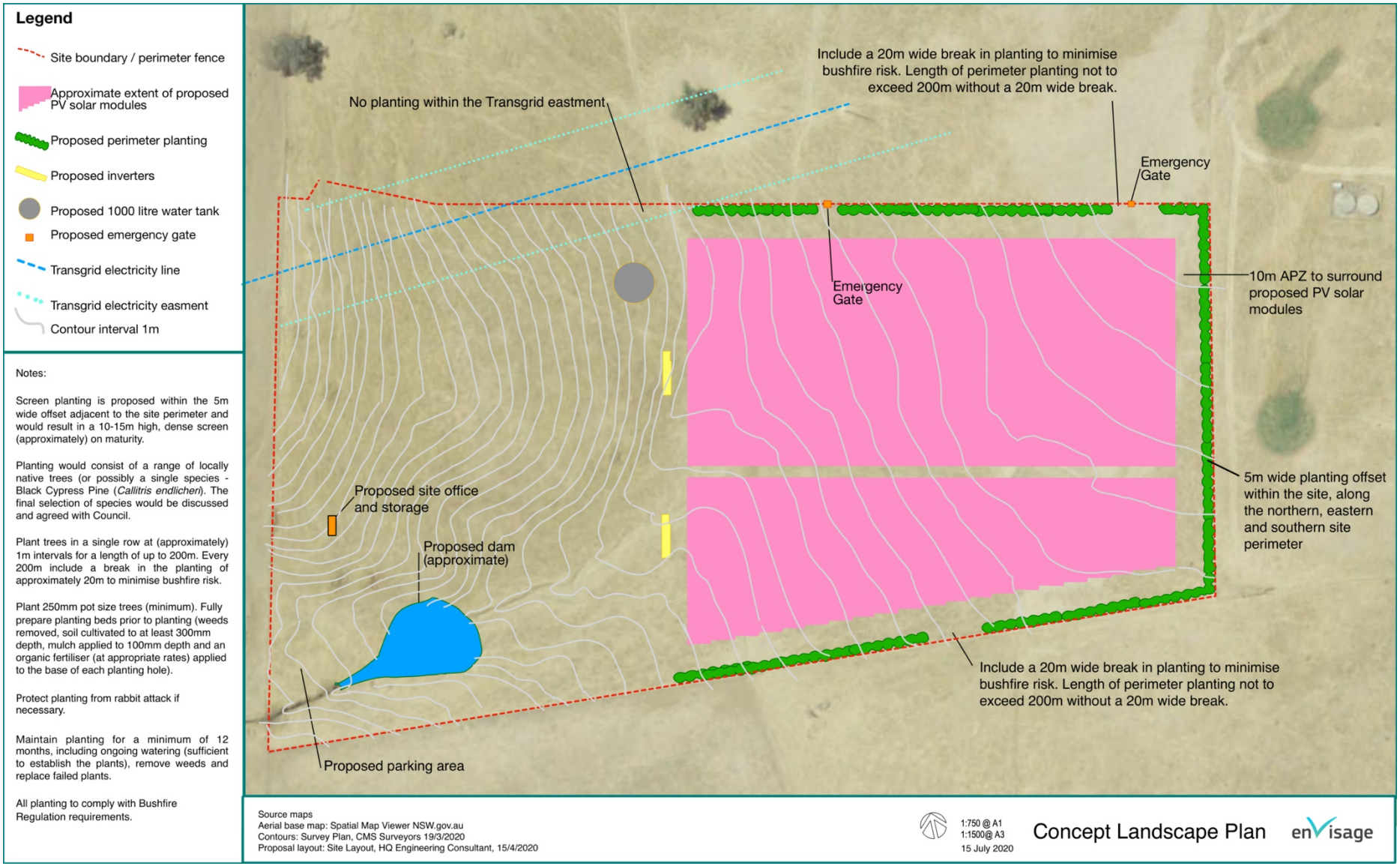


FIGURE 3-7: CONCEPT LANDSCAPE PLAN

Black Cypress Pine grows to approximately 10-15m tall and has a spread of approximately 3m. An image of a juvenile Black Cypress Pine is shown at FIGURE 3-8. A smaller species could be used for planting if preferred. The selection of species would be guided by Council to ensure the most appropriate outcome for neighbours use of their land and views.

FIGURE 3-8: BLACK CYPRESS PINE (JUVENILLE)[6]

3.4 Construction

Timing

The construction and commissioning phase could be expected to last approximately six months and commence in August 2020 (approximately).

Construction hours would be in accordance with the *Interim Construction Noise Guideline* (ICNG) recommended standard hours for construction as detailed below:

- Monday to Friday – 7am to 6pm
- Saturdays – 8am to 1pm, and
- Sundays or Public Holidays – No work.

No audible out-of-hours or night works are proposed excluding emergencies. In the event construction is required outside of these hours, approval from the relevant authorities and notification to the community would be undertaken. **Temporary facilities**

During the construction period, temporary facilities would be located within the site and may include: material laydown areas; construction site offices; and a parking area.

[6] Image from Australian Seed

Access

Entry to the site would be via the existing Five Mile Creek Road access gate, currently used to access the property. During construction, traffic to the site would include approximately five (5) to eight (8) construction worker vehicles daily, and small delivery vehicles. Heavy vehicles are not anticipated.

Installation

Most of the infrastructure for the solar farm would be prefabricated off-site, then delivered by trucks and assembled on-site.

3.5 Operation

Once operational, the proposed facility would require periodic site maintenance including inspections of equipment and cleaning of solar modules.

The site would not be operated at night and the Proposal does not include lighting.

3.6 Decommissioning

The Proposal is intended to have a lifespan of approximately 30 years. At the end of the 25-year lifespan, the facility would either be decommissioned, or its life extended. If decommissioned, all structures and other infrastructure would be removed, and the site would be returned to its pre-development condition.

4 Assessment methodology

4.1 Guidelines

The applied methodology used in this assessment is based on a number of well-regarded visual assessment guidelines used by government authorities and professional organisations in Australia and internationally, including:

- NSW Roads and Maritime Services' 2018 '*Environmental Impact Assessment Guidance Note – Guidelines for Landscape Character and Visual Impact Assessment*.'
- Australian Institute of Landscape Architects, 2018. '*Guidance Note for Landscape and Visual Assessment'*.
- 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.
- *'Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects'*, 2014, Sullivan and Meyer, for United States Department of the Interior.

4.2 Assessments undertaken

Two types of visual assessment are undertaken in this report:

- Assessment of landscape character effects (which assesses the effect of the Proposal on local landscape character as a resource and amenity in its own right), and
- Assessment of visual effects (which assesses the effects of the Proposal on specific viewpoints).

4.3 Methodology

The method to assess the level of impact to landscape character and to views is based on the combination of the 'sensitivity' of the existing landscape character or view to change, and the anticipated 'magnitude of the change' of the Proposal on that landscape character or view.

'Sensitivity' refers to aspects listed in TABLE 4-1. 'Magnitude of change refers to aspects listed in TABLE 4-2.

The relationship between 'sensitivity' and 'magnitude of change' determines the predicted level of impact. TABLE 4-3 defines the level of impact categories used in this assessment.

TABLE 4-1: 'SENSITIVITY' ASPECTS

'Sensitivity' of landscape character	'Sensitivity' of the viewpoint
▪ the scenic qualities of an area ▪ the value of a landscape as a visual resource to the community, and ▪ the ability of the landscape to accommodate change without undue consequences.	▪ the number and type of viewers ▪ their distance from the Proposal site ▪ the general value placed on the view ▪ the visual characteristics of existing view.

TABLE 4-2: 'MAGNITUDE OF CHANGE' ASPECTS

'Magnitude of change' to landscape character	'Magnitude of change' to the viewpoint
▪ the physical scale of the project (size, form and character) ▪ how distant it is ▪ the contrast it presents to the existing conditions, and ▪ the duration and reversibility of change.	▪ the scale of change to the view (loss or addition of features and changes in its composition) ▪ the extent to which it would be visually obvious in the overall scene (e.g. degree of contrast or integration of any new features) ▪ the nature of the view of the Proposal (in terms of distance, relative amount of time it would be seen (e.g. stationary or transient) and whether views would be full, partial or glimpses).

TABLE 4-3: LEVEL OF IMPACT CATEGORIES

Impact	General description
Negligible	No part of the Proposal, or work or activity associated with it, is discernible from a particular viewpoint or discernibly reduces the inherent and valued landscape characteristics.
Low	Only a very small part of the Proposal would be discernible and/or is at such a distance that it is scarcely appreciated. Consequently, it would have very little effect on the scene when seen from a particular viewpoint or may slightly reduce the inherent and valued landscape characteristics.
Low-Moderate	The Proposal constitutes only a minor component of the wider view, which might be missed by the casual observer. Awareness of the Proposal would not have a marked effect on the overall quality of the scene. The Proposal may reduce the inherent and valued landscape characteristics may reduce to a small extent.
Moderate	The Proposal forms a visible and recognisable new element within the overall scene that affects and changes its overall character, potentially in an adverse way, when seen from a particular viewpoint and/or by decreasing the inherent and valued landscape characteristics.
High-Moderate	The Proposal forms a significant and immediately apparent part of the scene that adversely affects and changes its overall landscape character, when seen from a viewpoint and/or by substantially decreasing the inherent and valued landscape characteristics.
High	The Proposal becomes a dominant and overall negative feature of the scene to which other elements become subordinate when seen from a viewpoint and/or significantly adversely affects inherent and valued landscape characteristics.

4.4 Field investigations

An early step in the assessment was to identify potentially sensitive public viewpoints, which were initially identified via aerial mapping and then verified during detailed field investigations.

The site was inspected 18 June 2020. The inspection included a walk- over the Proposal site and surrounding publicly accessible areas. The day of the inspection was dry and sunny.

Potentially sensitive viewing locations were confirmed during the field investigations. Visibility was assessed from the closest public access to each viewpoint and desktop analysis. Access to private properties was not undertaken.

4.5 Photography

Photographs included in this report have been taken using a 50mm lens on a full frame camera with GPS positioning. A 50mm lens was used as this is closest to the view perceived by a human eye. Unless otherwise noted, all photographs within this report were taken by Envisage Consulting.

5 Landscape character assessment

5.1 Existing landscape character

The visual context of the site, including key natural and built features within three kilometres, is shown in FIGURE 5-1 and described below.

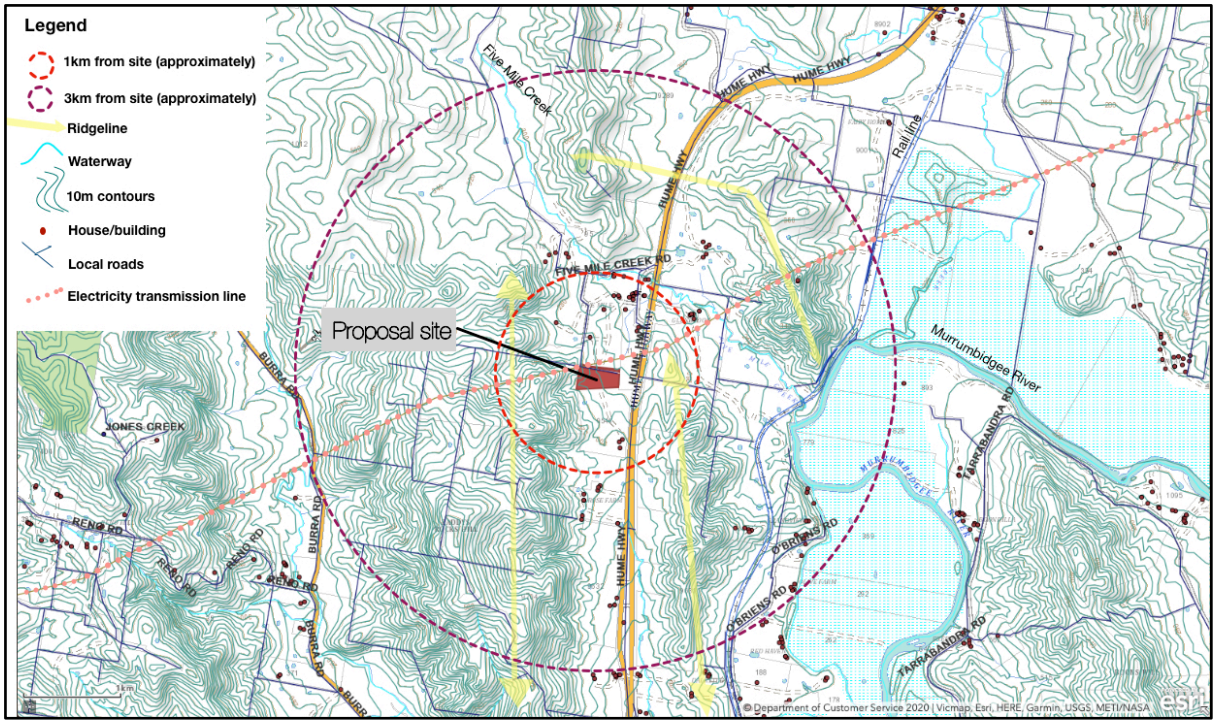


FIGURE 5-1: SITE CONTEXT

Land form

The Murrumbidgee River and river plain is approximately 1.75km to the east and separated from the site by steep hills which line both sides of the Hume Highway. The ridgeline rises 30m to 300m above the level of the site.

There are some distinctive 'knobbly' ridgelines and very steep gullies. There are also breaks in the ridgelines allowing views to more distant ridges.

Land use

The area is predominantly rural. Properties are generally covered in pasture grasses and range in size from 5 - 50ha, the larger lots occupying steeper land. There are a small number of rural homesteads and rural sheds.

The Hume Highway is a major north-south transport route bisecting the area. The Highway includes overhead road safety structures.

The Five Mile precinct, on flatter land adjacent the Highway, includes several larger-scale retail/service buildings providing tourist facilities such as fuel, food outlets, picnic tables, rest rooms and parking.

Vegetation

Native trees cover the surrounding steeper sloping land and are scattered throughout the lower lying pastures. There are also trees within the Hume Highway road reserve (grouped intermittently but at a greater density).

Heritage

The "Dog on the Tuckerbox" is at the site of an old camping ground. The memorial is listed on the *NSW State Heritage Inventory (SHI No.1680082)* as an item of local significance (*Gundagai LEP 2011*). The statement of significance states: the "*item is held in high esteem by the people of Gundagai as well as the wider community as a symbol of the spirit of the district's pioneers, as well as of the hardworking teamsters who stopped at the Five Mile*".

Setting

FIGURE 5-2 shows various images of the local landscape illustrating its predominant characteristics of grassed, rolling hills; rural properties either side of the Hume Highway; scattered rural dwellings, sheds and trees; surrounding steep slopes; distinctive ridgelines; larger-scale service facilities; and distant vistas.

FIGURE 5-2: PHOTOGRAPHS SHOWING LANDSCAPE CHARACTER OF STATION AND VICINITY

5.2 Desired landscape character

Gundagai LEP 2011 applies to the site and adjacent tourist zone. The site is within the RU1 (primary production) zone. An objective of the zone is to protect significant scenic landscapes. Scenic landscapes have not been identified within the area.

The Five Mile precinct is in the SP3 (tourist) zone. An objective of the tourist zone is to recognise and promote the cultural significance of the 'Dog on the Tuckerbox' memorial.

Gundagai Shire Development Control Plan for the 5-Mile Precinct (DCP, March 2007) applies to the tourist zone. The DCP recognises the "Dog-on-the-Tuckerbox" and the Five Mile precinct as the Shire's 'flag-ship' site and northern gateway to Gundagai town. Under the DCP, future development within the precinct needs to demonstrate a capacity to enhance the site's heritage associations, value as a tourism attraction, and landscape setting in this prominent Hume Highway location.

Although the DCP does not apply to the site, to support the aims of the DCP, the site and land within the vicinity should accommodate change only without undue consequence to the general setting of the precinct.

5.3 Sensitivity of character

Assessed sensitivity considered the following aspects:

- The rural vicinity of pastures, steep hills, native vegetation and distinctive ridgelines is very appealing
- The vicinity is part of the general 'gateway' to Gundagai and an important 'Australian pastoral' visual resource for the community
- The landscape of the site and the surroundings, contributes to the setting of the heritage listed "Dog on the Tuckerbox"
- Some of the existing larger-scale developments within the tourist zone currently detracts from the landscape setting.
- Low-profile changes could be accommodated on the lower parts of the site without undue consequence to local scenic quality.

5.4 Magnitude of change to character

The predicted magnitude of change to character considered the following aspects:

- The Proposal would involve minimal physical change to the site (no removal of trees, minimal earthworks).
- The Proposal would be low-profile (a maximum of 1m in height for the solar PV modules) and a dark colour (which would tend to be less noticeable.
- The solar PV modules would be installed only over the lower-lying, flatter portion of the site.
- Taller elements, such as the office/shipping container, water tank and inverters, would be potentially located on higher ground. However, they are also relatively small in scale (height around 2-2.5m) and have a similar in scale to surrounding rural infrastructure.
- The Proposal includes tree planting along the boundaries, which would, overtime, reduce visibility to the solar PV modules.

- The extent of area to be covered by solar PV modules is relatively small (approximately 5ha).

5.5 Summary of landscape character impact

The assessed impact of the Proposal on landscape character is shown in TABLE 5-1. Impact on landscape character would reduce over time (3-5 years) when proposed trees are able to screen the Proposal.

TABLE 5-1: SUMMARY OF LANDSCAPE CHARACTER IMPACTS

Timing	Level of impact
Initial impact to landscape character	Moderate to Low-moderate: The Proposal would constitute a minor component of the wider landscape; however, the landscape is part of the 'gateway' to Gundagai. The Proposal may slightly reduce the valued landscape characteristics of the landscape.
Impact to landscape character in 3-5 years' time	Low Following growth of proposed trees, there would be less visual awareness of the Proposal. Consequently, it would have very little effect on the scene.

6 Visual impact assessment

6.1 Extent of visibility

The site has limited visibility due to the surrounding, steep hills either side of the Hume Highway. These features contain the viewing area to a small area of close proximity, generally within 1km of the site. An approximate viewshed (geographical area that can see the site) is shown in FIGURE 6-1.

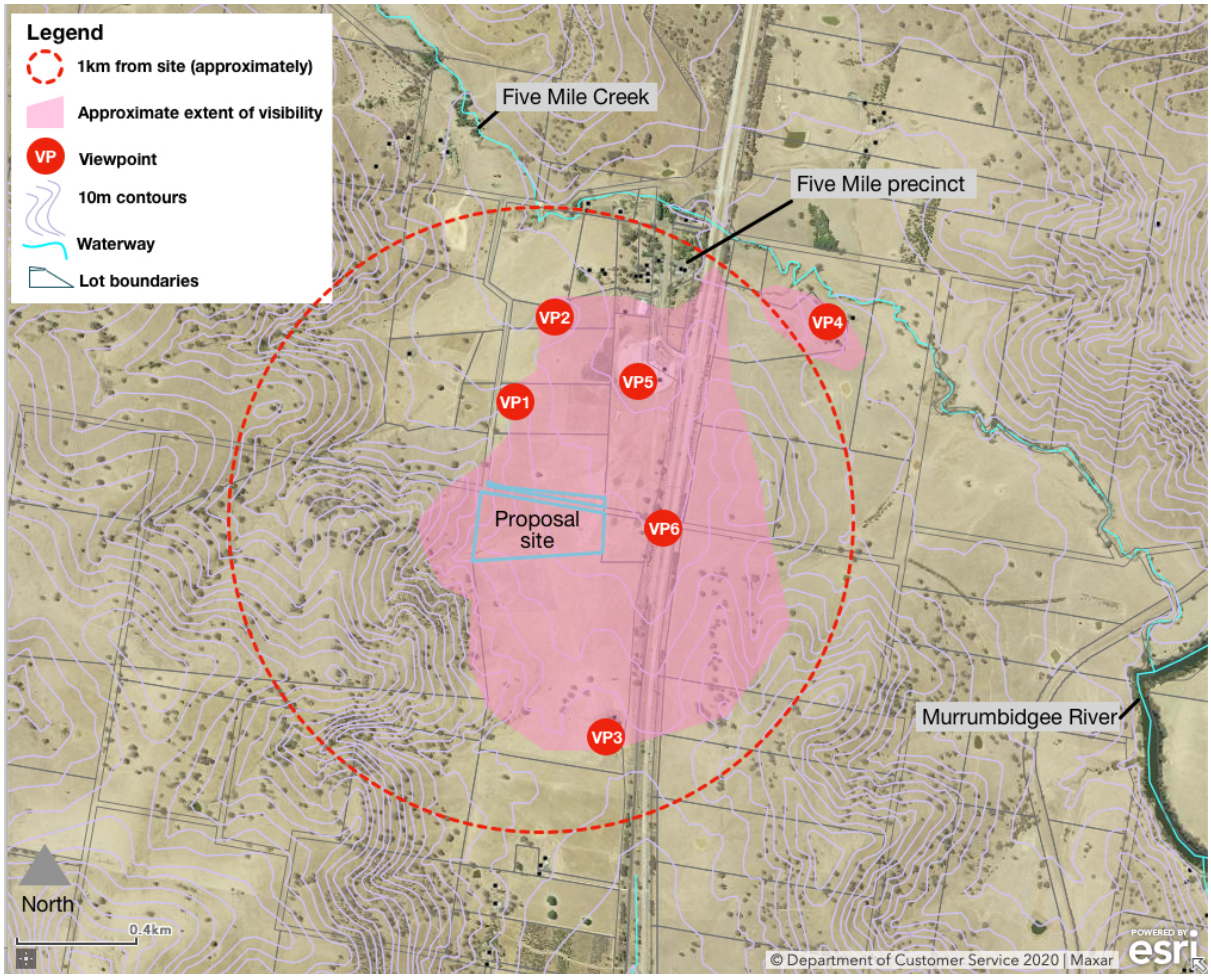


FIGURE 6-1: APPROXIMATE VIEWSHED AND VIEWPOINTS IDENTIFIED FOR ASSESSMENT

6.2 Viewpoints identified for assessment

Six viewpoints have been identified as the main potential viewing locations from where the Proposal would be visible. Those viewpoints are shown at FIGURE 6-1 and described and assessed in TABLE 6-1 to TABLE 6-6.

There are four private viewpoints:

- VP1: Residence, 108 Five Mile Creek Road
- VP2: Residence, Annie Pyers Drive
- VP3: Residence, 9546 Hume Highway
- VP4: Residence, 9321 Hume Highway.

With two public viewpoints:

- VP5: Five Mile precinct
- VP6: Hume Highway.

TABLE 6-1: VP1 - RESIDENCE, 108 FIVE MILE CREEK ROAD

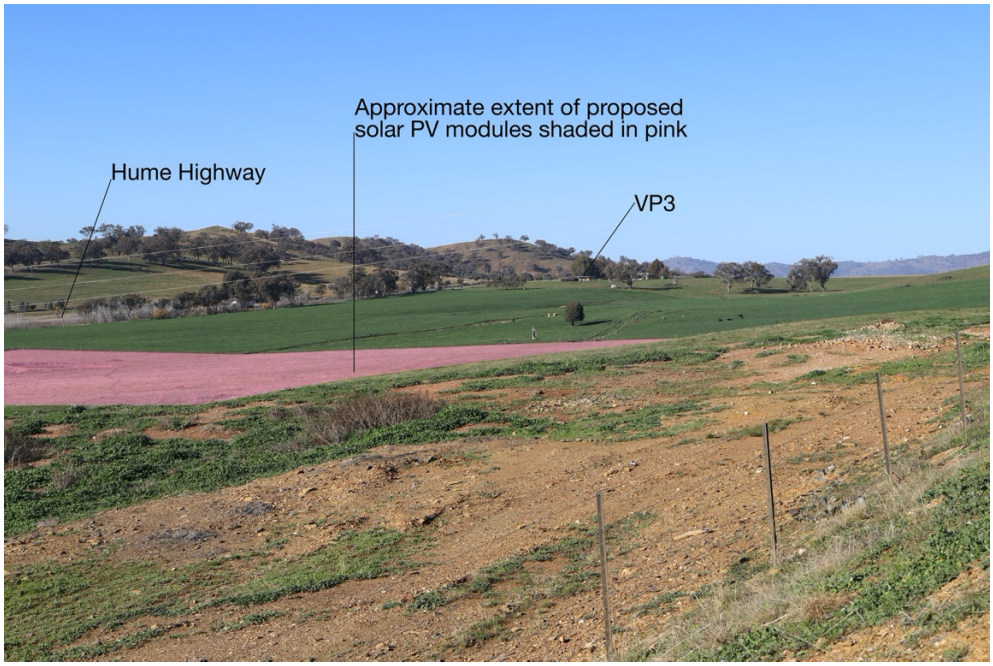
Existing view	 **FIGURE 6-2: EXISTING VIEW FROM VP1 WITH PROPOSAL APPROXIMATED** FIGURE 6-2 shows the view toward the site from Five Mile Creek Road (the closest public access to VP1). An additional photo, showing VP1 from the site is included at Appendix D.
Sensitivity to the Proposal	Assessed sensitivity considered the following aspects: ▪ VP1 is a residence, elevated 5 – 10m above the flatter area of the Proposal site. ▪ Views of the Proposal site are from relatively close proximity (approximately 250m away). ▪ A wide view is available from the viewpoint which includes rural hills, paddocks and distant views of ridgelines. The view also includes less-appealing features: electricity transmission lines, the Hume Highway, and the service station/truck parking area at Five Mile precinct (which is less than 400m from VP1). ▪ Views of the Proposal site (particularly the western, steeper portion) are limited by landform (i.e. mounding on the nearest side). Most of the flatter, lower portion of the site is in view.
Magnitude of impact	The predicted magnitude of change to the view considered the following aspects: ▪ From the eastern side of VP1 (the house and back yard), the 1m high solar PV modules and fencing would be visible. ▪ Modules would be low and dark and cover the flatter area of the site in the middle ground. ▪ Views beyond the site would not be obstructed. The proposed modules are non-reflective. ▪ The largest proposed elements (the shipping/storage containers) are of a size typical of rural infrastructure and would not greatly contrast the surroundings.
Level of Impact - Initial	**Low-moderate to moderate**: The Proposal would be a visible new element within the view and, for the resident, would reduce the quality of the view. However, the Proposal would be small in scale and a dark colour, and its impact on the overall quality of the view would be quite low.
Level of impact – 3-5 years time	**Low:** Overtime, as vegetation proposed to be planted around the site grows, the extent of the Proposal in view would reduce.

TABLE 6-2: VP2 - RESIDENCE, ANNIE PYERS DRIVE

Existing view	 **FIGURE 6-3: VP2 WITH SITE APPROXIMATED** There is no public access close to VP2, therefore, an image showing the view from this viewpoint has not been provided. A view of VP2 from the site is shown in FIGURE 6-3.
Sensitivity to the Proposal	Assessed sensitivity considered the following aspects: ▪ The view is from a private residence, slightly elevated above the flatter areas of the site. ▪ The residence is within moderate proximity (approximately 580m north) of the proposed solar PV modules. However, the view south toward the site is largely screened by trees around the residence. ▪ The residence is close to the service station/truck parking area at Five Mile precinct (which is approximately 225m away) and has clear views of this less-appealing feature within the landscape.
Magnitude of impact	The predicted magnitude of change to the view considered the following aspects: ▪ The addition of solar PV modules would not significantly change the view south. ▪ To see the Proposal, viewers would most likely need to stand outside the residence, south of the screening trees near the residence. ▪ The modules would be low and dark and cover a very small area in the middle ground. ▪ Views beyond the site would not be obstructed.
Level of Impact	**Low:** The Proposal would constitute a minor component of the wider view. The Proposal would be small scale and viewed from outside of the residence. At this distance, the Proposal would have very little effect on the view.
Level of impact – 3-5 years time	**Low**

TABLE 6-3: VP3 – RESIDENCE, 9546 HUME HIGHWAY

Existing view	 **FIGURE 6-4: EXISTING VIEW FROM VP3 WITH PROPOSAL APPROXIMATED** FIGURE 6-4 shows the view toward the site from the Hume Highway road reserve (adjacent to VP3). An additional photograph, showing VP3 from the site is included at Appendix D.
Sensitivity to the Proposal	Assessed sensitivity considered the following aspects: ▪ The view is from a private residence within moderate proximity of the site (approximately 580m south) and elevated above the site ▪ The view north includes most of the Proposal site, rural hills, paddocks and more distant ridgelines. ▪ Trees within the VP3 property screen part of the view, including part of the lower, flatter area of the Proposal site.
Magnitude of impact	The predicted magnitude of change to the view considered the following aspects: ▪ The solar PV modules would be seen as a narrow band over the flatter area of the site, partially screened by existing trees. ▪ The modules would be low and dark and non-reflective. ▪ Views beyond the site would not be obstructed. ▪ The largest proposed elements (the shipping/storage containers), may be located over the higher slopes within the site. Their size would be typical of infrastructure within the rural landscape and not greatly contrast the surroundings. ▪ Overtime, the Proposal would be further screened by trees.
Level of Impact - Initial	**Low-moderate**: The Proposal would be a new element within the view. However, due to its small scale and dark colour, it would be unlikely to have a marked effect on the overall quality of the view.
Level of impact – 3-5 years time	**Low**: Overtime, as proposed screen planting grows, the Proposal would reduce in visibility, and would become less noticeable within the wider view.

TABLE 6-4: VP4 – RESIDENCE, 9321 HUME HIGHWAY

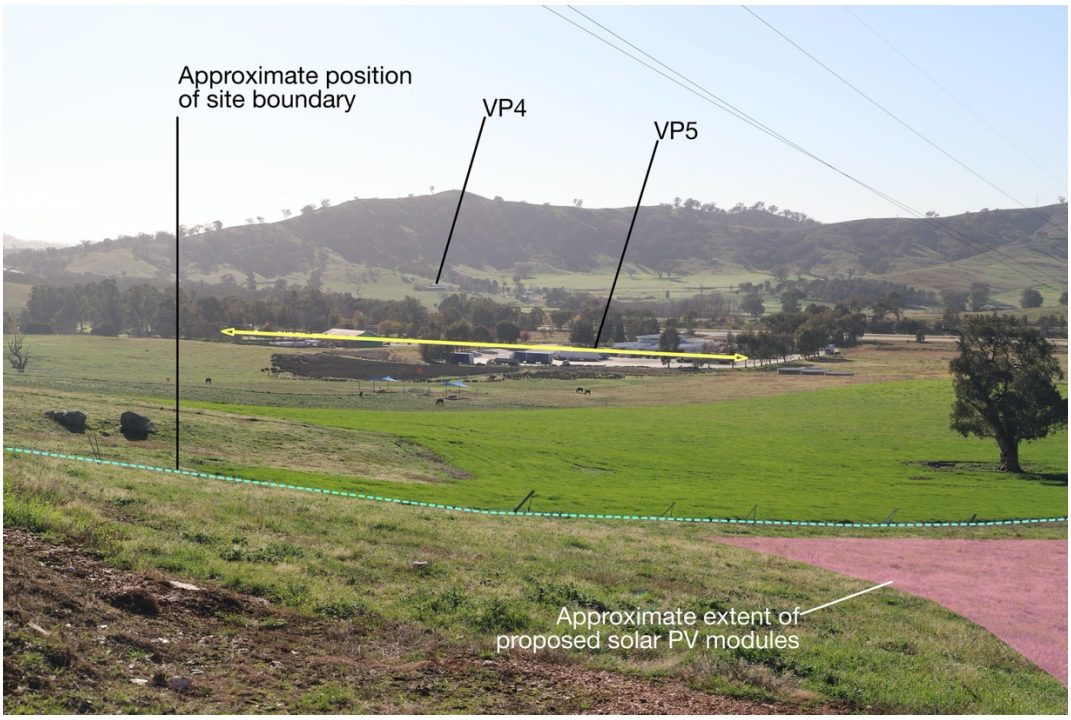
Existing view	 **FIGURE 6-5: VP4 WITH SITE APPROXIMATED** There is no public access close to VP4, therefore, an image showing the view from this viewpoint has not been provided. A view of VP4 from the site is shown in FIGURE 6-5.
Sensitivity to the Proposal	Assessed sensitivity considered the following aspects: ▪ The view is from a private residence, on the eastern side of the Hume Highway, almost 1km from the site (approximately 920m north-east) ▪ The view toward the site is limited by vegetation and landform and includes the Hume Highway in the foreground. It may also include the Five Mile precinct intersection and service station/truck parking area.
Magnitude of impact	The predicted magnitude of change to the view considered the following aspects: ▪ The addition of solar PV modules would not significantly change the view toward the site and any change would occur to a very small component of the view ▪ The modules would only be partially visible, in the middle ground of the view, and appear as a low narrow, dark band. ▪ Distant views of hills would not be obstructed. ▪ The largest proposed elements (the shipping/storage containers) are of a size typical of the rural landscape and would not greatly contrast the surroundings and be a very small element and barely discernible.
Level of Impact	**Low:** Only a very small part of the Proposal would be discernible and at such a distance that it is scarcely appreciated. It would have very little effect on the scene. No further mitigation required for this viewpoint.
Level of impact – 3-5 years time	**Low**

TABLE 6-5: VP5 – FIVE MILE PRECINCT

Existing view	The Five Mile precinct to the north of the site includes a service station, Oliver's food outlet and the heritage listed "Dog on the Tuckerbox". Three views are provided below as each facility provides a different viewpoint. FIGURE 6-6 shows the view toward the site from the service station forecourt. FIGURE 6-7 shows the view toward the site from the picnic area in front of Oliver's. FIGURE 6-8 shows the view toward the site from the car park north of the "Dog on the Tuckerbox" memorial. In each figure, the approximate site boundary is shown in blue dashed line and the approximate extent of solar PV modules shown in pink shading.

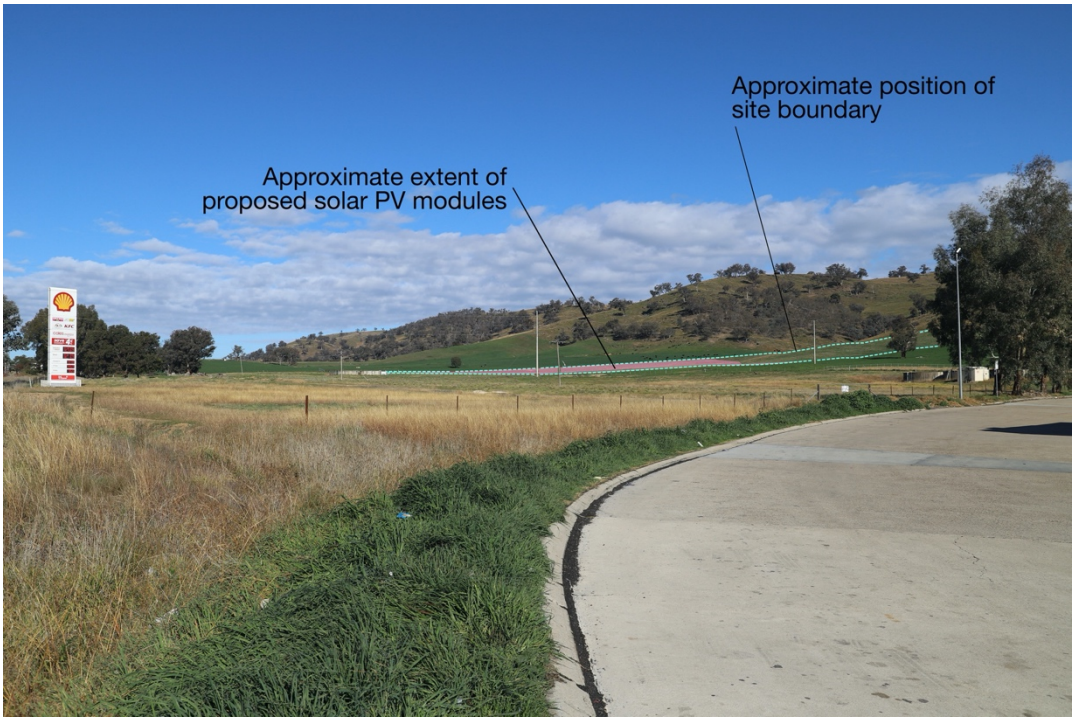


FIGURE 6-6: EXISTING VIEW FROM VP5 – SERVICE STATION FORECOURT

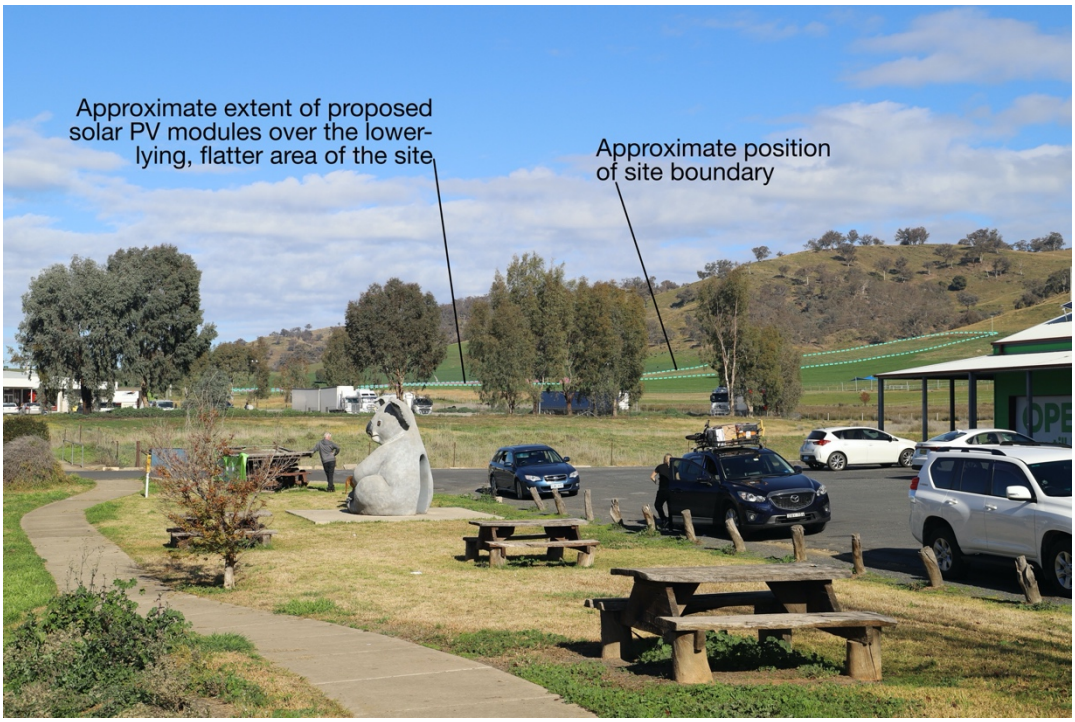
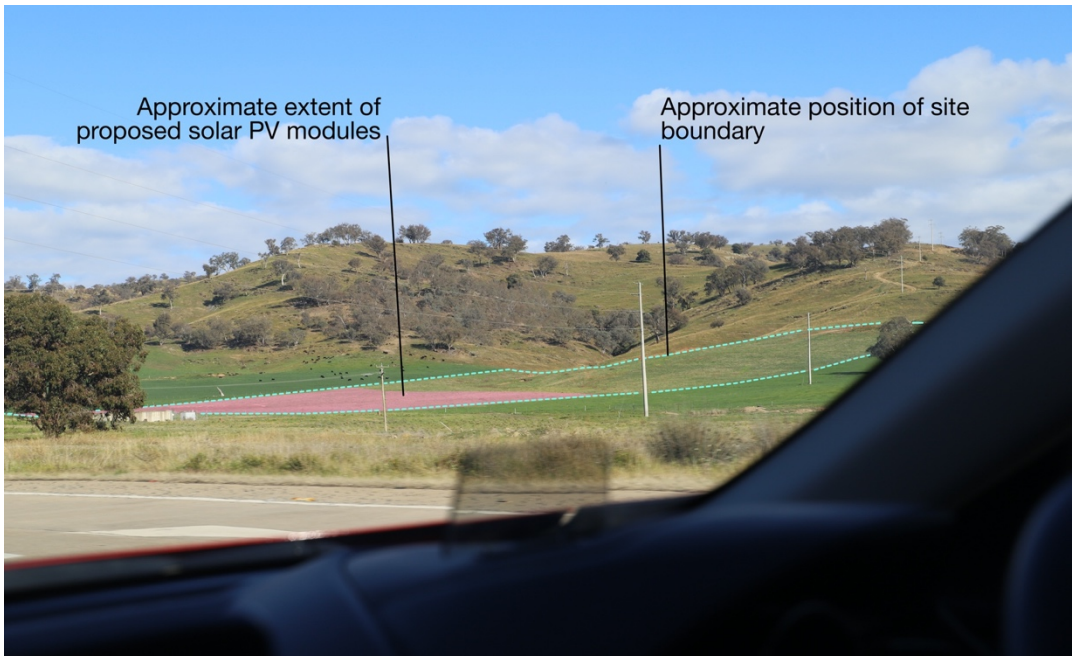


FIGURE 6-7: EXISTING VIEW FROM VP5 – OLIVER'S FOOD OUTLET PICNIC AREA

	 **FIGURE 6-8: EXISTING VIEW FROM VP5 – "DOG ON TUCKERBOX" CAR PARK**
Sensitivity to the Proposal	Assessed sensitivity considered the following aspects: ▪ Ordinarily, a service station would not be considered a sensitive viewpoint. However, as this service station is part of the Five Mile precinct, it caters to a high number of tourists arriving to view the "Dog on the Tuckerbox" and to appreciate the Gundagai landscape, and therefore has greater sensitivity to change. It is approximately 450m from the Proposal site and has an unobstructed, narrow view of the site. ▪ Oliver's is approximately 620m from the site. It includes a picnic area. A narrow, partial view of the site is possible with a truck parking area in the foreground. ▪ Views of the site are not possible from the "Dog on the Tuckerbox" memorial or café. ▪ From the rest area west of the "Dog on the Tuckerbox" memorial (approximately 775m from the site) and from the car park north of the memorial (approximately 800m from the site) viewers have a very limited, narrow view of the site, partially screened by buildings and vegetation.
Magnitude of impact	The predicted magnitude of change to the view considered the following aspects: ▪ The Proposal would impact a very small area of the seen view. ▪ The extent to which it would be visible varies depending on proximity. From the service station (the least sensitive area within the Five Mile precinct) the Proposal would be more obvious, however, would still be quite small in scale. From the "Dog on the Tuckerbox" rest area, the Proposal would be barely noticeable. ▪ The solar PV modules would appear as a narrow, dark band. They would not be particularly prominent or greatly contrast the surroundings.
Level of Impact - Initial	**Low-moderate** - In general, the assessed level of impact is low due to the minor scale of the Proposal and its minimal visibility from most viewpoints within the precinct. However, from the service station forecourt, the assessed level of impact is low-moderate, as the Proposal would be visible and recognisable as a new, minor component within the wider view.
Level of impact – 3-5 years time	**Low** - Following the growth of planting around the Proposal, the modules would be largely screened. Only a very small part of the Proposal would be discernible and have very little effect on the scene.

TABLE 6-6: VP6 – HUME HIGHWAY

Existing view	The site is seen from a 2km stretch (approximately) of the Hume Highway. It is a liner viewpoint - views are generally available for a brief period of time and the view changes as the viewer moves through the viewpoint. FIGURE 6-9 shows the view toward the site when travelling from north to south, toward Gundagai.  **FIGURE 6-9: EXISTING VIEW FROM VP6 – TRAVELLING SOUTH**
Sensitivity to the Proposal	Assessed sensitivity considered the following aspects: ▪ The Highway at this locality is an important transit 'gateway' to Gundagai, used by a large number of travellers. ▪ At its closest, the road reserve is approximately 140m from the site; the carriageway is approximately 165m from the site. ▪ Views are temporary and the site is seen at speed (generally from a moving vehicle). ▪ The site occupies a relatively small area within the view. ▪ Viewing opportunity is limited due to gaps in the vegetation within the road reserve.
Magnitude of impact	The predicted magnitude of change to the view considered the following aspects: ▪ The Proposal would comprise a moderate proportion of the view. ▪ The modules would appear in the middle ground of the view as a narrow, dark band, 150m from the viewer at the closest point [7] ▪ The Proposal would be low in elevation and not obscure the broader view of steep slopes and paddocks. ▪ Planting along the site boundary would significantly reduce views of the Proposal over time.
Level of Impact - Initial	**Low-moderate** to **moderate** - The Proposal would form a recognisable new element within the overall scene. It would be very small in scale, and a relatively minor addition to the landscape given its low height and dark colour, however, it would somewhat reduce the overall scenic quality of the 'gateway' to Gundagai.
Level of impact – 3-5 years time	Low - Overtime, following the growth of proposed vegetation, views of the Proposal would be screened, and awareness of the Proposal would reduce. Additional planting within the road reserve (if possible) would further reduce visibility.

[7] An image of a solar farm near a major road is provided at Appendix E.

6.3 Summary of visual impact to identified viewpoints

The assessed impact of the Proposal on views is summarised in Table 6-7.

TABLE 6-7: SUMMARY OF IMPACTS TO VIEWPOINTS

Viewpoint	Assessed visual impact on initial construction	Assessed visual impact 3-5 years following construction (allowing for landscape screening)
VP1: Residence, 108 Five Mile Creek Road	Low-moderate to moderate	Low
VP2: Residence, Annie Pyers Drive	Low	Low
VP3: Residence, 9546 Hume Highway	Low-moderate	Low
VP4: Residence, 9321 Hume Highway	Low	Low
VP5: Five Mile precinct	Low-moderate	Low
VP6: Hume Highway	Low-moderate to moderate	Low

7 Mitigation and management actions

7.1 Best practices to reduce visual impact

The following is a list of best practices for proposed PV solar facilities to reduce potential visual impact[8].

1. Minimise impact through use of design features (including vegetation screening)
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.

Recommendations in this report to mitigate the visual impact of the Proposal have been informed by these best practices.

7.2 Design modifications made

Prior to finalising this assessment, the design of the Proposal was modified substantially to reduce its visual impact and meet the above best practices:

- The extent of the proposed site covered was significantly reduced from approximately 90% to approximately 60%
- The layout of the proposed solar PV modules was modified to only cover the lower-lying, flatter areas of the site
- Tree planting around the site perimeter was introduced to the Proposal (to screen views from residences and the highway).

7.3 Recommended mitigation measures

TABLE 7-1 lists the best practices, the positive features of the Proposal, and additional mitigation measures recommended to reduce landscape character and visual impact.

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

TABLE 7-1: 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 would have limited visual exposure due to the design of the proposed low-profile PV modules (approximately 1m above the ground) and their proposed location on the site's flat, lower-lying topography. - The surface of the panels would be non-reflective. - Taller features of the Proposal, such as the inverter shelters and office/storage container, would be dark in colour and be a similar scale to farm sheds. - The water tank and dam are features typical of rural properties.	Construction: - Keep site tidy and neat. - Keep vehicles and temporary structures on flatter ground. - To further reduce impacts to the closest viewers (VP1 and VP6) discuss opportunities for planting within or along the Hume Highway road reserve and close to the VP1 residence (discuss with residents and the RMS/Council). Operation: - Do not install commercial messages, or large-scale signage. Signage (if required) should be of sufficient size to contain only information sufficient for basic facility and company identification, for safety, navigation, and delivery purposes.
2. Minimise and repair ground disturbance	- The Proposal would be located within an area already cleared of trees. - Installation does not require site levelling, heavy machines, concrete foundations or cable trenching. - The ground surface under the panels would essentially remain unchanged.	Construction: - If soils are disturbed (eg. during construction of internal roads or due to wear and tear of surfaces from vehicle movement), introduce wind erosion controls to reduce potential for dust: o Bring water cart on site and water exposed surfaces o avoid ground disturbance on high wind days o cover stockpiles of loose materials (if any).
3. Site facilities away from most prominent land features (locate in less prominent locations and away from focal points)	- The PV panels would be sited to avoid the more elevated, steeper and more visually exposed parts of the site.	
4. Avoid night sky impacts	- The Proposal would not be operated at night. Lighting of the site is not required and is not anticipated unless in emergency situations.	Operations: - Use amber lighting if lights are required, rather than bluish-white lighting
5. Site facilities in already disturbed landscapes or clearings	- The site is already cleared of tall vegetation. - Tree clearing is not required.	

Best-practice	Existing positive measures within the Proposal	Additional measures recommended
6. Increase distance to reduce visual dominance	- A 15m buffer would be provided from site boundaries to the solar PV modules - Including the buffer, the solar PV modules would be set back approximately 185m from the closest public viewpoint (Hume Highway) and approximately 265m from the closest residences (VP1).	
7. Use site-specific location and topographic features to reduce visibility	- The solar PV modules would be located only over the site's flat, lower-lying topography. - Existing vegetation along the Hume Highway which filters views of the site would be retained	
8. Use colour to reduce contrast	- The surface of the solar PV modules would be a dark colour and non-reflective. - Taller features of the Proposal, such as the inverter shelters and office/storage container, would be dark in colour and be similar scale to farm sheds. - The darker tones of vegetation proposed to be planted around the site perimeter and help conceal the solar PV modules. - From VP1, VP2 and VP3, proposed perimeter trees would provide a darker background to the solar PV modules and reduce their visibility.	Construction: - Paint or colour-treat ancillary components (such as the inverter shelters and office/shipping container) to decrease their visibility and contrast. Dark grey is generally considered a good colour for ancillary infrastructure. - Do not leave components white or light-coloured structures. - Fences surrounding the solar farm should have a dulled, darkened finish to reduce contrast. Black or dark grey is generally a suitable colour. 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: - Six months following construction, contact the nearest residents (with their agreement) to determine if visual issues are being experienced. - Discuss possible remedies for visual issues (such as through planting close to residences).

8 Conclusion

The Proposal is to install a 4MW solar farm over approximately 5ha of rural land, 5.5km north of Gundagai. The site is within 1km of the Five Mile precinct (including the "Dog on the Tuckerbox") which is part of the 'gateway' to Gundagai and an important location for the community.

The Proposal would comprise a mesh of low-profile (maximum height 1m) solar PV modules over the flatter, lower-lying areas of the site. The perimeter of the site would be planted with trees.

Impact to landscape character

The Proposal would involve minimal physical change to the site, would be small in scale, non-reflective, appear as a low, dark area on the flatter part of the site, and have no moving parts. The Proposal would be a relatively minor component of the overall scene. The predicted impact to landscape character is **low-moderate**.

Following the growth of proposed trees to be planted around the solar farm, there would be less visual awareness of the Proposal, and the impact is predicted to reduce to **low**.

Impact to viewpoints

Six viewpoints (VPs) with views of the Proposal site were identified:

- four residences (ranging in distance from approximately 250m to 920m from the site) and
- two public viewpoints (the Five Mile precinct and the Hume Highway).

Views to the site are not possible from the "Dog on the Tuckerbox" memorial.

The initial predicted level of impact to four of the viewpoints, including the Five Mile precinct, is **low** or **low-moderate.** The Proposed PV solar modules would be a new element within the view, however, they would be low-profile, dark in colour, and only a small extent would be visible within the wider scene for most viewers. Taller proposed elements (the inverter shelters and office/storage container), would be at a scale similar to surrounding rural infrastructure and they would also be dark in colour to reduce their contrast with the surroundings. The proposed water tank and dam are typical features of rural properties.

From the Hume Highway and the nearest residence, the initial predicted impact is **low-moderate** to **moderate.** The nearest resident is in relatively close proximity and would have an elevated and potentially sustained view of the Proposal. From the Hume Highway, a large number of people would view the Proposal at relatively close proximity as they travel toward Gundagai.

Once proposed vegetation grows, the predicted level of impact reduced to **low** for all viewpoints.

Conclusion

Overall, the Proposal would be of a small scale and would have relatively low visibility (due to its dark colour, low-profile and positioning on the lowest-lying, flatter area of the site). It would not be a prominent feature, particularly at a distance, however, initially it would somewhat reduce the overall scenic quality of the 'gateway' to Gundagai.

Proposed screen planting would reduce the visibility and impact of the Proposal, and could completely screen the Proposal from the Hume Highway overtime. Screening is critical to achieving an acceptable visual outcome, particularly from this viewpoint, in the longer term.

9 References

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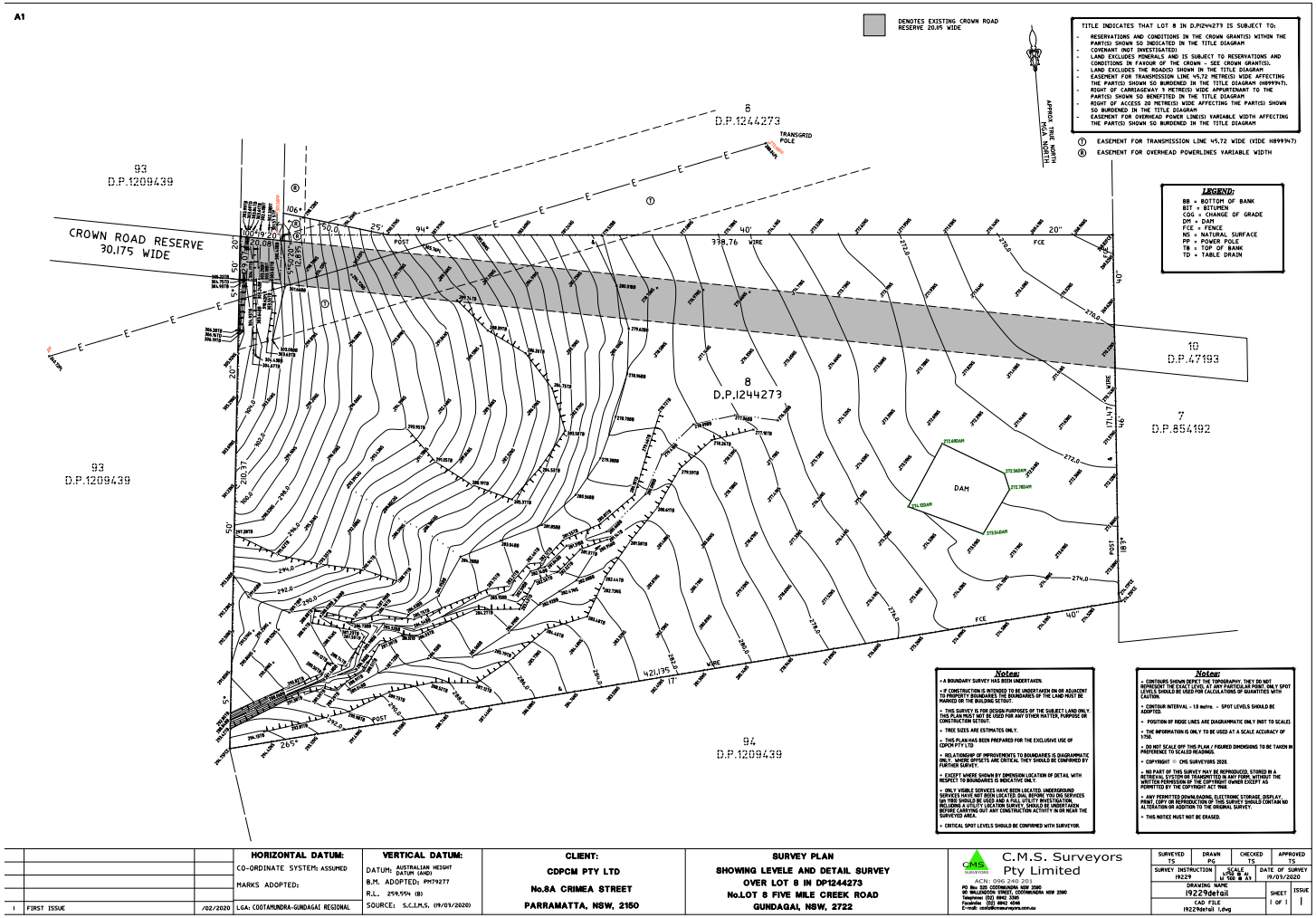
- United States Department of the Interior. 2013. *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands.* Bureau of Land Management. Cheyenne, Wyoming.

Appendix A – Survey plan



Appendix B – Effect of elevation on view

To illustrate the effect of elevation on colour (and on the extent of project in view), two images of the 7ha (approximately) Mount Majura Solar Farm (near Canberra) are presented below. The viewer position in the first image is approximately 5m above the level of the solar farm. The viewer position in the second image is approximately 15m above the level of the solar farm.

The small increase in elevation reveals more of the solar farm and the colour of the PV modules changes from bluish to black. (The images are taken at the same time of day (late afternoon), mid-winter, from approximately 175m distance).

Please note that the solar PV panels at the Mount Majura Solar Farm are approximately 4m high (four times the height of the Proposal) and are tilted (unlike the Proposal).

Appendix C – Effect of distance on view

To illustrate the effect of distance on colour (and extent of project in view), two images of the 34ha (approximately) Royalla Solar Farm (near Canberra) are presented below. The viewer position in first image is approximately 400m from the solar farm, and approximately 10m lower in elevation. The viewer position in the second image (zoomed in to enable the solar farm to be seen) is approximately 2.3km from the solar farm, and approximately 50m higher than the level of the solar farm.

The increase in distance and elevation changes the appearance of the solar from a narrow dark band, to a wider light bluish area. (The images are taken at the same time of day (mid-day) in early summer).

Please note that the solar PV panels at the Royalla Solar Farm are approximately 4m high (four times higher than the Proposal), almost seven times larger than the Proposal, and tilted (unlike the Proposal).

Appendix D - Additional viewpoint photos

Below, a view of VP1 from the site.

Below, a view of VP3 from the site.

Appendix E – Example of solar farm near main road

An image of the 26ha (approximately) Williamsdale Solar Farm (near Canberra) is presented below. The solar farm is approximately 200m from the Monaro Highway (route B23 which links the Princes Highway, Victoria, to Canberra). The viewer position is similar to the level of the solar farm.

Please note that the solar PV panels at the Williamsdale Solar Farm are approximately 4m high (four times higher than the Proposal), over five times larger than the Proposal, and tilted (unlike the Proposal).