

Figure 6-4
Wollara Road photomontage (inset)

Commentary
This single frame photograph was captured using a full frame camera with a 50mm focal length and is presented with a 39.6° horizontal field of view (HFOV). It is regarded as providing a depth of field that is closest to human eyesight, albeit that we typically have wider peripheral vision.

Accurate representation of this photomontage is achieved when viewed at a comfortable arm's length with 100% zoom.

(Source: Landscape Institute Technical Guidance Note 06/19)



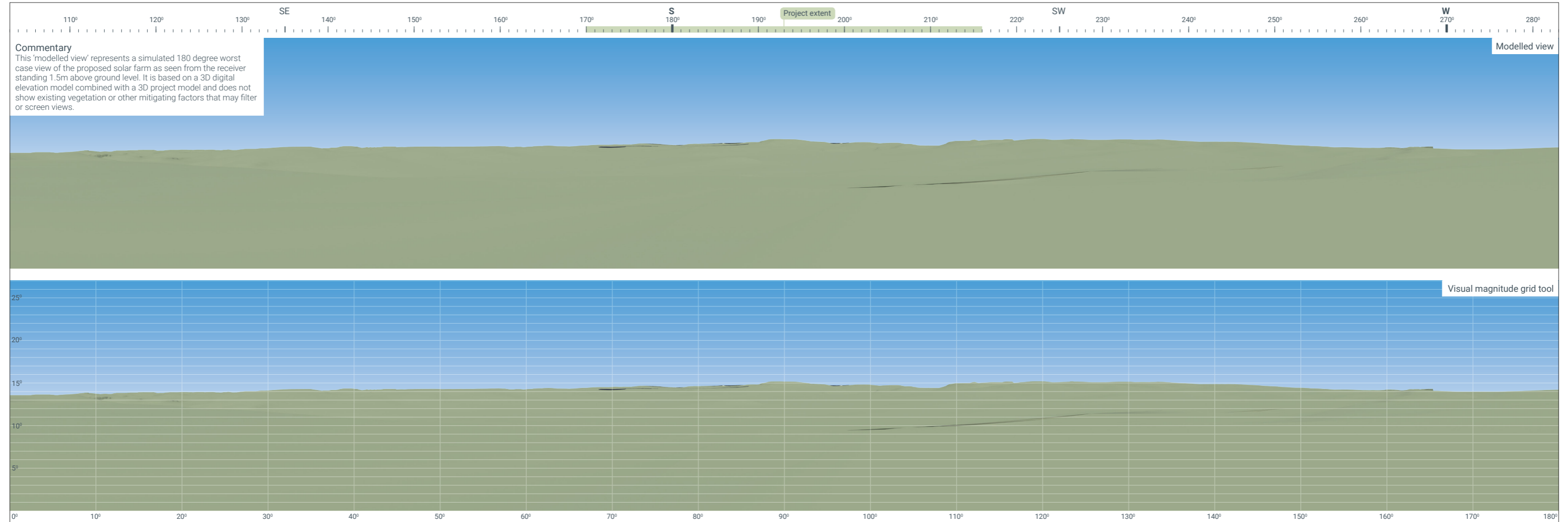
Date	07/02/23
Time	12:09
Camera level	332mAHD
Camera coordinates	E224256.m, N6424587m
Camera	Canon EOS 6D Mark II (full frame DSLR)
Panorama type	50mm portrait
Bearing	99°
Vertical field of view	39.6° (cropped to 27°)
Horizontal field of view	39.6°
Geodetic datum	GDA2020
Projection	MGA
Zone	56
Photography	Envisage Consulting

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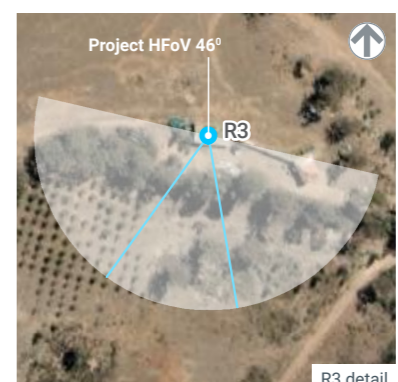
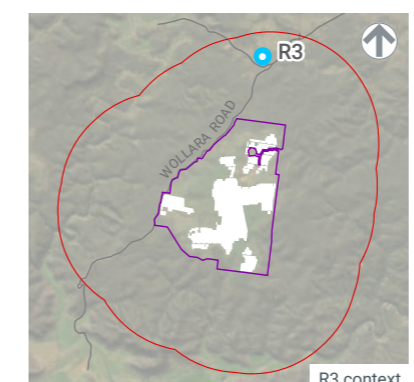
Figure 6-5
R3 modelled view

GOULBURN RIVER SOLAR FARM | LANDSCAPE AND VISUAL IMPACT ASSESSMENT



Commentary
This 'modelled view' represents a simulated 180 degree worst case view of the proposed solar farm as seen from the receiver standing 1.5m above ground level. It is based on a 3D digital elevation model combined with a 3D project model and does not show existing vegetation or other mitigating factors that may filter or screen views.

Viewpoint ID	Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Visual sensitivity	Occupied cells	Magnitude rating	Impact rating
R2	3.06km	Residential	Moderate	Moderate	Moderate	0	Very low	Low



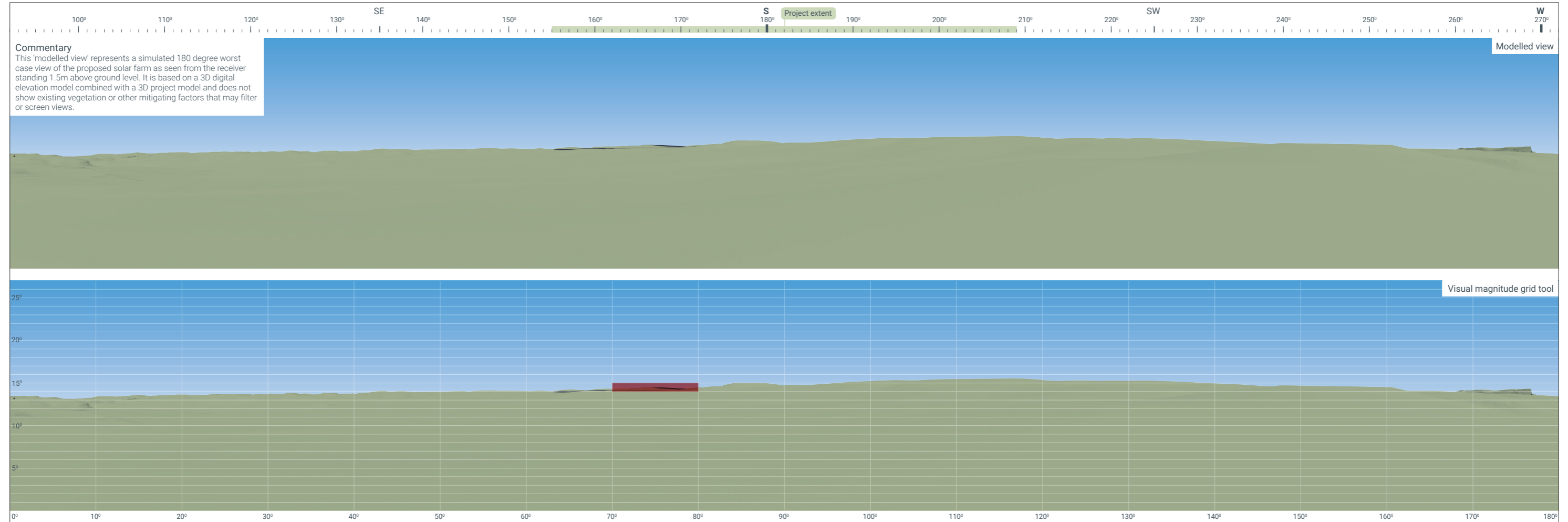
Camera level	325.5mAHD
Camera coordinates	E228277.61m, N6430303.07m
Camera	Virtual
Panorama type	50mm portrait (simulated)
Bearing	193°
Vertical field of view	39.6° (cropped to 27°)
Horizontal field of view	180°
Geodetic datum	GDA2020
Projection	MGA
Zone	56

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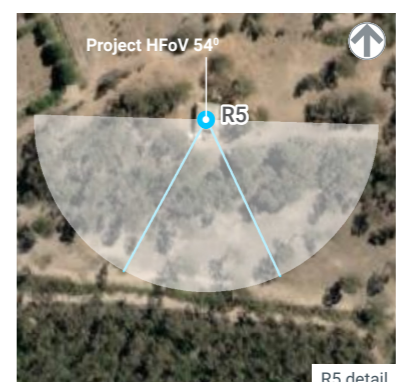
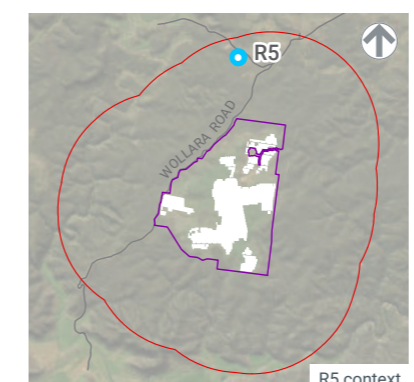
Figure 6-6
R5 modelled view

GOULBURN RIVER SOLAR FARM | LANDSCAPE AND VISUAL IMPACT ASSESSMENT



Commentary
This 'modelled view' represents a simulated 180 degree worst case view of the proposed solar farm as seen from the receiver standing 1.5m above ground level. It is based on a 3D digital elevation model combined with a 3D project model and does not show existing vegetation or other mitigating factors that may filter or screen views.

Viewpoint ID	Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Visual sensitivity	Occupied cells	Magnitude rating	Impact rating
R5	3.24km	Residential	Moderate	Moderate	Moderate	1	Very low	Low



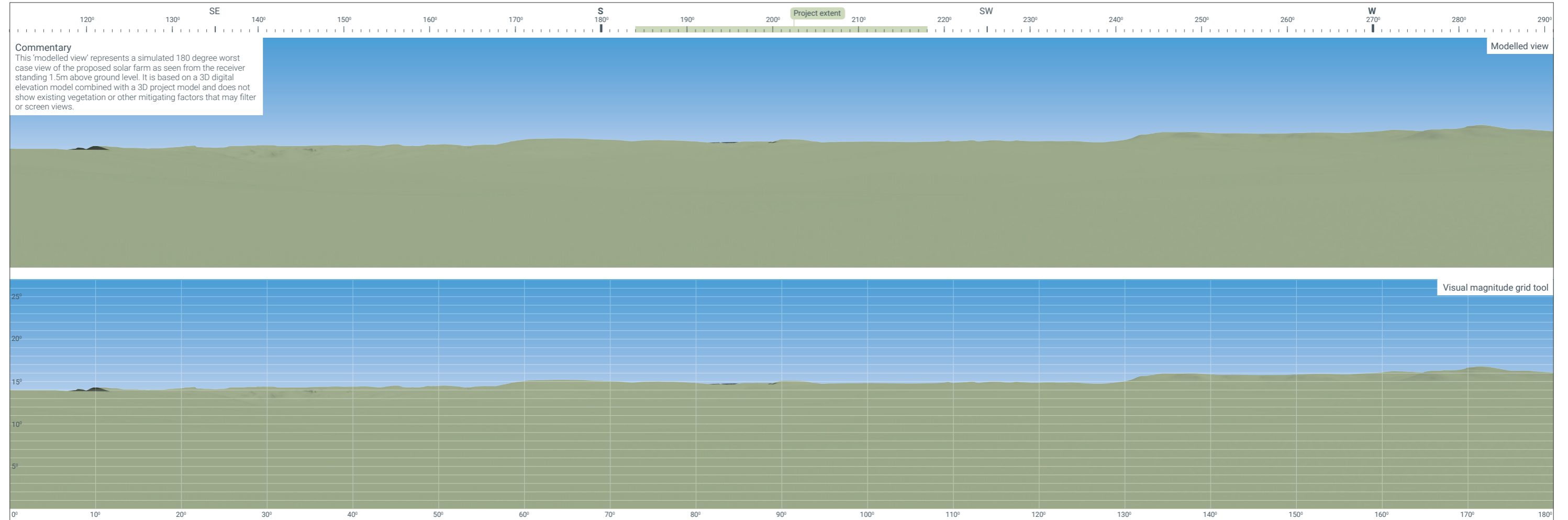
Camera level	338.5mAHD
Camera coordinates	E227320.87m, N6430263.91m
Camera	Virtual
Panorama type	50mm portrait (simulated)
Bearing	182°
Vertical field of view	39.6° (cropped to 27°)
Horizontal field of view	180°
Geodetic datum	GDA2020
Projection	MGA
Zone	56

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Figure 6-7
R46 modelled view

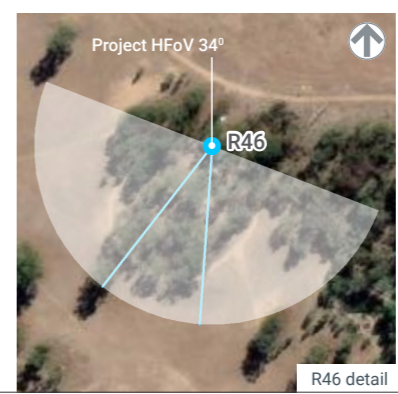
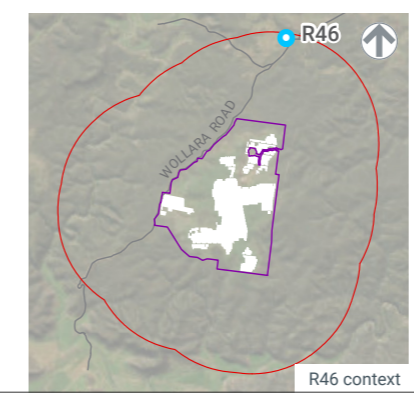
GOULBURN RIVER SOLAR FARM | LANDSCAPE AND VISUAL IMPACT ASSESSMENT



Commentary
This 'modelled view' represents a simulated 180 degree worst case view of the proposed solar farm as seen from the receiver standing 1.5m above ground level. It is based on a 3D digital elevation model combined with a 3D project model and does not show existing vegetation or other mitigating factors that may filter or screen views.

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Viewpoint ID	Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Visual sensitivity	Occupied cells	Magnitude rating	Impact rating
R46	3.82km	Residential	Moderate	Moderate	Moderate	0	Very low	Low



Camera level	303.5m AHD
Camera coordinates	E229208.49m, N6431023.57m
Camera	Virtual
Panorama type	50mm portrait (simulated)
Bearing	201°
Vertical field of view	39.6° (cropped to 27°)
Horizontal field of view	180°
Geodetic datum	GDA2020
Projection	MGA
Zone	56



The number of occupied cells in each of the modelled views was identified and counted, then compared to the visual magnitude threshold (Table 2-2). The resulting magnitude rating is shown in Table 6-1 (a summary of findings is also presented below each modelled view).

Table 6-1: Visual magnitude ratings

Viewpoint	Number of occupied cells	Visual magnitude rating
Wollara Road	67	Very high
R3	0	Very low
R5	1	Very low
R46	0	Very low

6.3 Stage 3 – Determine visual sensitivity

For each viewpoint in the detailed assessment, the sensitivity of the viewpoint is determined and scenic quality of the area in view is categorised. This step is typically undertaken by:

1. Classifying the sensitivity of each viewpoint into one of four sensitivity ratings (very low, low, moderate or high) using Table 5 of the *Technical Supplement* as a guide (a copy is provided at Appendix C)
2. Classifying scenic quality into one of three ratings (low, moderate, or high) using Table 6 and Table 7 of the *Technical Supplement* as a guide (a copy is provided at Appendix D)
3. Combining sensitivity and scenic quality using the matrix shown in Table 2-3.



Access to the private viewpoints (R3, R5 and R46) was not possible, therefore, sensitivity and scenic quality were determined based on site inspections to nearby properties, aerial photography, the classification for residential zoning using Table 5 of the *Technical Supplement*, and the view of the property from the nearest publicly available view (the entrance to the property).

The results of the Stage 3 analysis are presented in Table 6-2, including a photograph of each private property entrance to illustrate scenic quality in the vicinity.

Table 6-2: Visual sensitivity ratings

Viewpoint	Sensitivity	Scenic quality	Visual sensitivity rating
Wollara Road	Low Low use tourist road	Low Limited, close view of forest and adjacent agricultural scenery. Images of the scenic quality experienced from Wollara Road are shown in Figure 4-5, Figure 4-6 and Figure 4-7.	Low
R3	Moderate (Rating is assumed as primary view from dwelling zoned RU1)	Moderate It has been assumed there is a localised view of forested landscape and agricultural scenery. A photo from the property entrance is shown Figure 6-8 Figure 6-8: Photo of R3 residence from Hulks Road	Moderate



Viewpoint	Sensitivity	Scenic quality		Visual sensitivity rating
R5	Moderate (Rating is assumed as primary view from dwelling zoned RU1)	Moderate It has been assumed there is a localised view of forested landscape and agricultural scenery. A photo from the property entrance is shown Figure 6-9. Figure 6-9: Photo of R5 residence from Hulks Road		Moderate
R46	Moderate (Rating is assumed as primary view from dwelling zoned RU1)	Moderate It has been assumed there is a localised view of forested landscape and agricultural scenery. A photo from the property entrance is shown Figure 6-10. Figure 6-10: Photo of R5 residence from Wollara Road		Moderate

6.4 Stage 4 – Visual impact

The overall visual impact rating is determined by combining the [visual magnitude](#) rating with the [visual sensitivity](#) rating (as per [Table 2-4](#)). Viewpoints with a moderate, or higher, impact, are to be assessed against performance objectives. The results of the Stage 4 analysis are presented in [Table 6-3](#).

Table 6-3: Visual impact ratings

Viewpoint	Visual magnitude rating (as per Table 6-1)	Visual sensitivity rating (as per Table 6-2)	Visual Impact rating	Visual performance objective. Is mitigation required?
Wollara Road	Very High	Low	Moderate	Assess against performance objectives (refer to SECTION 6.5)
R3	Very Low	Moderate	Low	No mitigation required
R5	Very Low	Moderate	Low	No mitigation required
R46	Very Low	Moderate	Low	No mitigation required

A summary of sensitivity and visual impact is also included below each of the modelled images (refer to [Figure 6-3](#) to [Figure 6-7](#)).

6.5 Stage 5 – Performance objectives and mitigation

As shown in [Table 6-3](#), Wollara Road, has a moderate visual impact rating, and is the only viewpoint requiring mandatory assessment against 'performance objectives'. The visual performance objectives to be addressed for viewpoints with a moderate visual impact (as per the *Technical Supplement*) are:

- Visual impact mitigation is required in consultation with the affected landowner and should be proportional to the scale of impact.
- There is no expectation this mitigation should eliminate the view of the development entirely but must reduce the impact to an acceptable level.
- Appropriate mitigation options include vegetation screening or project landscaping to reduce impacts.
- If the available mitigation options would not be effective in reducing impacts or are unsuitable due to the nature of the impact (e.g., screening would result in the obstruction of views), then project redesign and/or impact agreements should be considered.

Consultation with affected landowners is outlined below, followed by recommended mitigation measures, and the rating of residual visual impact (following the implementation of mitigation).

6.5.1 Consultation regarding visual impact and potential mitigation

Affected landowners surrounding the Project include:

- NSW National Parks and Wildlife Service (NP&WS) - NP&WS operates the surrounding 72,300 ha of Goulburn River National Park. The area was reserved as National Park in 1983, following extensive environmental assessment identifying the area's significant natural and cultural heritage.
- NSW Crown Lands - Access to the Proposal Area relies on access through a Crown Reserve (managed by the Hunter Local Land Services). Consent from Crown Lands as landowner, to lodge the development application has been obtained. In addition, the Project may require use of Crown roads, and consent for their use has also been obtained.
- Traditional Aboriginal custodians - Parts of the Crown Reserve are subject to Aboriginal Land Claims, therefore, Aboriginal interests are also included among affected landowners.

Umwelt's consultation with affected landowners commenced through Project briefing meetings (held during September – November 2021) and has been ongoing. During consultation, landowners have been asked if they have visual concerns about the Project, and whether screening is important. To date, neither matter has been of particular interest.

Broader community consultation has also been ongoing throughout the development of the Project, via phone calls and emails between Umwelt and community representatives, and through Umwelt's community information sessions (held throughout-2022). During consultation with community representatives, Umwelt asked each person to indicate how important the matter of 'visual amenity and changes to the landscape character' was to them. The matter was not rated as important.

6.5.2 Mitigation measures

Although there has been no community or landowner concerns regarding visual issues, mitigation is recommended to reduce views of the solar panels from Wollara Road, and to avoid lighting impacts on the night sky¹⁶. Proposed mitigation includes perimeter landscaping, and implementation of lighting design principles. Proposed landscaping is described below. Other measures to reduce the visual impact of the Project in the landscape are listed in [Table 6-4](#).

¹⁶ potential night sky impacts are discussed at [SECTION 7](#)

Draft landscape plan

Perimeter planting along Wollara Road is proposed in the vicinity of proposed solar panels, and is illustrated in the draft landscape plan shown in [Figure 6-11](#). The draft landscape plan outlines the intended planting strategy and location for planting, including a draft planting schedule (list of appropriate plant species) planting guide and ongoing management.

The aim of proposed landscaping is to establish a quick growing, dense screen to reduce public views of the solar panels from Wollara Road, as well as providing additional ecological benefits. Planting would be within the Project Area, located between Wollara Road and the security fence, in three planting areas based on expected mature plant heights (to avoid casting shadows on solar panels).

An early draft of the landscape plan was sent to NP&WS for input (February 2023). NP&WS advised the plan, including species selection, looked appropriate (their email response is provided at Appendix E). They suggested propagation of species from local provenance sourced seed, which has been incorporated into the draft plan. A copy of the updated landscape plan was sent to NP&WS (6 April 2023) for their information and further input. A response has yet to be received.

Subsequent to project approval, the content of the draft landscape plan would be guided by ongoing consultation with NP&WS, in particular the species, spacing, and whether soil improvement is required. The draft landscape plan would be refined and detailed in a later design stage when the Engineering Procurement and Construction contractor is finalising the layout of the Project. The detailed landscape plan would be prepared prior to landscape implementation.

Further details regarding the content of the draft and detailed landscape plan are provided in [Figure 6-11](#).

Other mitigation measures

Mitigation measures in addition to recommended landscaping are listed in [Table 6-4](#).

Table 6-4: Mitigation measures

Intent	Timing	Measure
Avoid night sky impacts	Design	<ul style="list-style-type: none"> - Design and install lighting to follow best practice lighting principles identified within the Dark Sky Planning Guidelines¹⁷: <ol style="list-style-type: none"> 1. Eliminate upward spill light 2. Direct light downwards, not upwards 3. Use shielded fittings 4. Avoid 'over' lighting 5. Switch lights off when not required 6. Use energy efficient bulbs 7. Use asymmetric beams, where floodlights are used 8. Ensure lights are not directed towards reflective surfaces 9. Use warm white lighting colours.
	Construction	<ul style="list-style-type: none"> - Ensure all lights are turned off before vacating the construction site at the end of the day. - Lighting to be installed in accordance with AS4228-1997 - Control of Obtrusive Effects of Outdoor Lighting.
	Operation	<ul style="list-style-type: none"> - Switch lights off when not required. - Ensure lights are only used in exceptional circumstances – emergency or security situations.
Reduce visibility and contrast of Project in the landscape	Design	<ul style="list-style-type: none"> - Select an inconspicuous colour for the office/storage containers if possible, so they are darker in colour and less prominent¹⁸. Dark grey is generally considered a good colour for ancillary infrastructure. - Fences surrounding the solar modules should have a dulled finish to reduce contrast. Do not install highly reflective materials.
	Construction	<ul style="list-style-type: none"> - Locate the construction compound, vehicle parking and equipment storage areas, in the vicinity of the Post War homestead (as shown on Project Area plans) so they are set back from Wollara Road and partially (or fully) screened from view (from Wollara Road) via existing vegetation or landform. - Keep site tidy and neat.

¹⁷ Australian Government, Department of the Environment and Energy, *National Light Pollution Guidelines for Wildlife*, January 2020 and New South Wales Department of Planning & Environment, *The Dark Sky Planning Guideline*, June 2016

¹⁸ Inverters and other larger 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.

Intent	Timing	Measure
		<ul style="list-style-type: none"> - If soils are disturbed (e.g., during the construction of internal roads or due to wear and tear of surfaces from vehicle movement), introduce wind erosion controls to reduce the potential for dust: <ul style="list-style-type: none"> • bring water cart to site and water exposed surfaces • avoid ground disturbance on high wind days - cover stockpiles of loose materials (if any).
	Operation	<ul style="list-style-type: none"> - Do not install commercial messages or large-scale signage. Signage (if required) should be of sufficient size to contain only information sufficient for the basic facility and company identification, for safety, navigation, and delivery purposes.
Minimise impact to existing landscape character	Design	<ul style="list-style-type: none"> - Retain as much existing vegetation within the solar farm Project Area as possible.
	Construction	<ul style="list-style-type: none"> - Protect existing trees (that are to be retained) during construction activities.

6.5.3 Residual impact assessment

A photomontage (refer Figure 6-12) shows the likely effectiveness of proposed landscaping seen from the affected public viewpoint – Wollara Road.

The photomontage illustrates reduced visual impact, based on an estimated 3 – 5 years following initial planting. There is a significant reduction in magnitude rating from very high (with 67 cells occupied) to very low (3 cells occupied). Consequently, the visual impact rating for Wollara Road reduces from moderate (following construction) to **very low** (3 – 5 years following the implementation of landscaping).

A summary of residual impact ratings for the four assessed receivers is shown in Table 6-5.

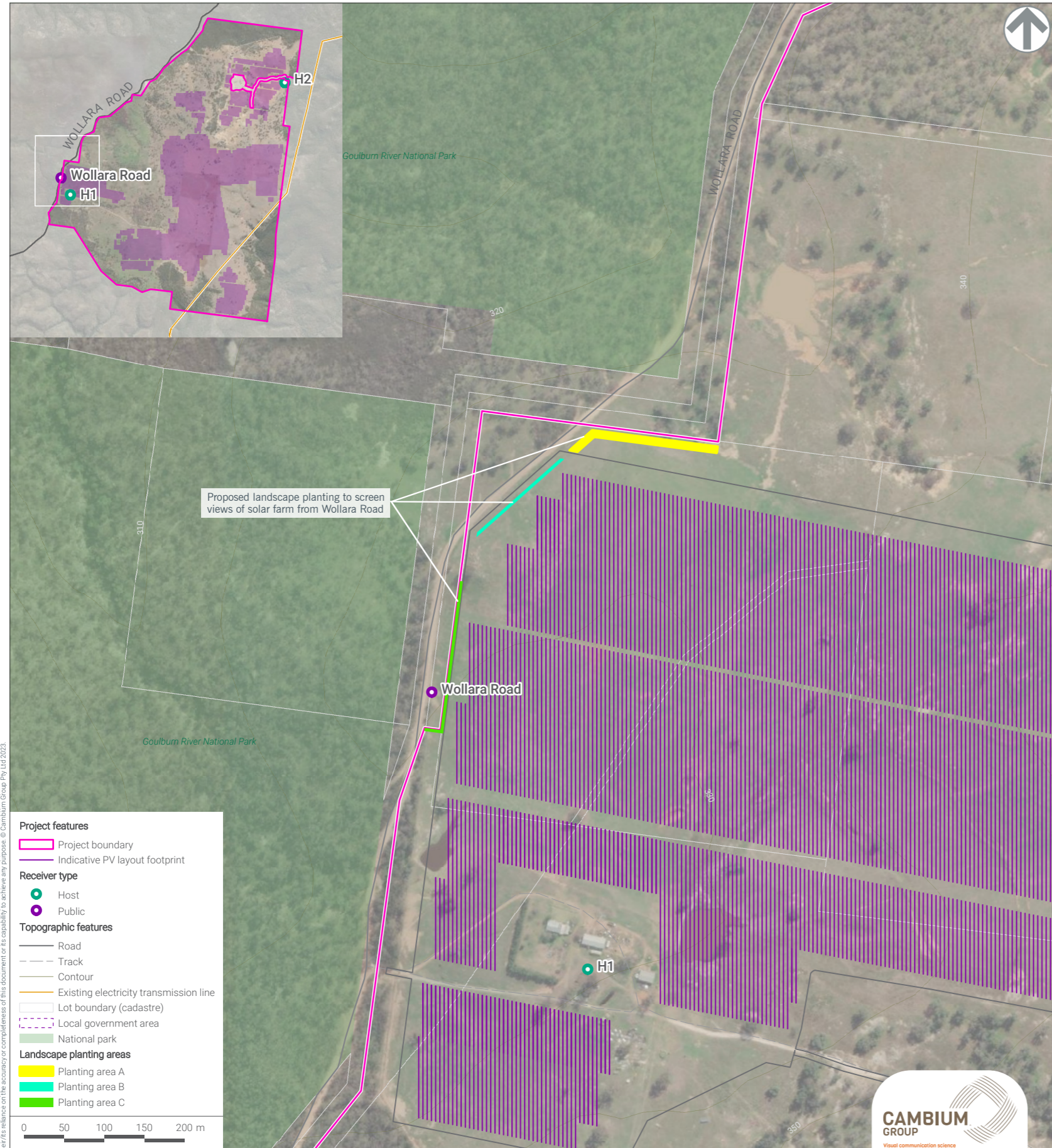
Table 6-5: Residual visual impact ratings

Viewpoint	Visual impact rating (following construction)	Residual visual impact rating (3-5 years following implementation of proposed landscaping)
Wollara Road	Moderate	Very low
R3	Low	Low
R5	Low	Low
R46	Low	Low

Residual impact ratings for all receivers identified during the assessment are shown on Figure 6-14.

Figure 6-11
Draft landscape plan

GOULBURN RIVER SOLAR FARM | LANDSCAPE AND VISUAL IMPACT ASSESSMENT



Landscape strategy

The aim of proposed landscaping is to establish a quick growing, dense screen to reduce public views of the solar panels (from Wollara Road), as well as providing additional ecological benefits. Plant species have been selected that:

- are locally native
- are suitable for the site conditions (are hardy)
- will provide effective visual screening
- will provide ecological benefits (such as a food source for birds, habitat etc)
- include quick growing as well as longer-living species.

Draft landscape plan and planting guide

The draft landscape plan (shown Figure 1) indicates proposed perimeter screen planting on-site, adjacent to Wollara Road. Three planting areas (A, B and C) are proposed based on expected mature plant heights to avoid casting shadows on solar panels:

- Planting area A is 8 m wide and includes plants to 18 m high
- Planting area B is 8 m wide and includes plants to 8 m high
- Planting area C is 4 m wide and includes plants to 5 m high

Sourcing plants

1. Proposed species are shown in the draft planting schedule (Table 1).
2. Propagate plants from local provenance sourced seed. Plan for sourcing as early as feasible.
3. Plant pot sizes for all plants to be 75 mm tubestock.

Site preparation

4. When marking out planting area, ensure the root zone of remnant vegetation is protected.
5. Eradicate existing weeds and pasture grass species within the planting area at least one month before planting (with spot removal/treatment prior to planting if required). Carefully manage weed control measures when in vicinity of existing trees. Any proposed use of herbicides to be approved by NPWS.
6. Cultivate to a depth of 60 cm in tined rows 50 – 100 cm apart for full width of planting area. Do not cultivate within the root zone of remnant vegetation.
7. Incorporate soil improver and/or organic fertiliser (if appropriate and approved by NPWS) following soil testing in a number of locations to determine the appropriate soil conditioning.
8. Apply mulch to a minimum depth of 75mm across the planting area.

Planting

9. Avoid planting during harsh weather conditions (i.e. mid-summer and mid-winter)
10. Select species for each planting area (A, B or C) from the draft planting schedule. Ensure only species marked for each planting area, are planted within that planting area.
11. Planting random order within each planting area to ensure an even mix of species .
12. Plant within the central 6 m of the 8 m wide planting area for planting areas A and B, and the central 2 m of the 4 m wide planting area for planting area C (i.e. with a 1 m buffer along each side).
13. Plant at densities to achieve about 50 plants per 10 lineal metres of the planting area.
14. Install natural fibre weed mats and biodegradable plant guards around each plant suitable for rabbit protection (if applicable) and install stock fencing around the planting area to protect from grazing sheep/cattle if necessary.
15. Water at the time of planting, weekly for first 3 months, fortnightly for next 3 months and as required over first 18 months. Watering to take account of any rainfall and adjust as needed.
16. Keep records of maintenance practices, including listing species that have failed and any substituted plant species.

¹ This ratio is generally consistent with the *Revegetation Guide for Holbrook, Hume and Urana Districts* (Murray Catchment Management Committee & Department of Land & Water Conservation (1998))

Draft planting schedule

The draft plant schedule provides an indicative range of site-appropriate species¹ for future use in landscaping the site. The selection of species would be further refined during preparation of the detailed landscape plan.

Table 1: Planting schedule

Botanical name	Common name	Approximate mature height (m)	Planting area
Medium tree			
<i>Acacia implexa</i>	Hickory Wattle	5 - 12	A
<i>Callitris endlicheri</i>	Black Cypress Pine	15	A
<i>Eucalyptus dealbata</i>	Tumbledown Red Gum	15	A
<i>Pittosporum undulatum</i>	Native Daphne	15	A
Small tree / tall shrub			
<i>Acacia decurrens</i>	Black wattle	3 - 10	A and B
<i>Acacia doratoxylon</i>	Currawang	3 - 8	A and B
<i>Acacia linearifolia</i>	Narrow-leaved wattle	10	A and B
<i>Persoonia linearis</i>	Narrow-leaved Geebung	2 - 5	A, B and C
Shrub			
<i>Allocasuarina distyla</i>	Scrub She-oak	1 - 3	A, B and C
<i>Baeckea densifolia</i> (<i>Harmogia densifolia</i>)		1.5	A, B and C
<i>Calytrix tetragona</i>	Common Fringe-myrtle	2	A, B and C
<i>Cassinia cunninghamii</i>	Cunningham's Everlasting	1 - 1.5	A, B and C
<i>Dodonaea triangularis</i>		3	A, B and C
<i>Grevillea sericea</i>	Pink Spider Flower	2	A, B and C
<i>Hibbertia monogyna</i>		0.5	A, B and C
<i>Indigofera australis</i>	Australian Indigo	2.5	A, B and C
<i>Leptospermum parvifolium</i>		2	A, B and C
<i>Leucopogon muticus</i>	Blunt Beard-heath	1.5	A, B and C
Tall grass			
<i>Lomandra glauca</i>	Pale Mat-rush		A, B and C
<i>Lomandra longifolia</i>	Spiny-headed mat-rush		A, B and C
Climber			
<i>Clematis aristata</i>	Old Man's Beard		A, B and C

¹ *Vegetation of the Merriwa Area, New South Wales*, R.H.D McRae and M.G. Cooper, 1985
* Species has been identified at the Project site during the ecological survey

Detailed landscape plan

Subsequent to project approval, a detailed landscape plan would be prepared which would refine the concepts presented in this draft. It is recommended that the detailed landscape plan be prepared with input from the NSW National Parks and Wildlife Service. Final species selection, ratio/rate of planting, and the planting guide may vary depending on future advice, the Project construction program and plant availability at the time.

The detailed landscape plan is to include a landscape maintenance plan for the operational period of the Project, to ensure proposed landscaping achieves, and continues to achieve, intended outcomes. The maintenance plan is to include:

- a defined initial establishment period of a minimum of 18 months
- a schedule for monitoring planting areas and watering during the establishment period
- ongoing maintenance practices during and post establishment (such as a weeding/mulching regime)
- guidance for replacement planting (for plants that fail to thrive).

Plan prepared by registered landscape architect (Stacey Brodbeck) RLA #719 (Australian Institute of Landscape Architects). A detailed landscape plan is required once the project is approved, to fully document and confirm planting locations and plant species.