



NARRABRI SOLAR FARM

Visual Analysis and Landscape Concept

Prepared for:

Providence Asset Group

704/99 Bathurst Street, SYDNEY NSW 2000

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PROJECT NAME

Location	Lot 489, DP 754944 115 Airport Road, Narrabri, NSW 2390
Project Number	620.30220.00000
Client	Providence Asset Group

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
620.30220.00000-v0.1	February 2021	Dallas Ellis	Dean Butcher	Dean Butcher
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1. INTRODUCTION

1.1 Background

This Visual Analysis and Landscape Concept has been prepared for the proposed Solar Farm near Narrabri, NSW.

This visual analysis assessment has been prepared to provide an effective and objective assessment of the anticipated high level impacts of the project on the surrounding visual environment.

SLR has worked closely with other members of the project team in determining and rating visual impacts of the proposed solar farm project works on its immediate surrounds as well as suggesting mitigation measures to further reduce any impacts that may occur.

There are 2 parts to this report.

- Visual Analysis, and
- Landscape Concept.

1.2 Site Location

The land on which the Solar Farm is located (the subject site) for the proposed Solar Farm (the project) is situated approximately 3km south east of Narrabri Township.

The site is located at Airport Road, and the proposed development will consist of solar panels mounted on single-axis trackers connected to a power conversion station with an access and hardstand area from Airport Road. The development will be confined to Lot 489 DP754944 (**Figure 1**).

LEGEND



-  Proposed Lease Area (Subject Site)
-  Railway



Figure 1. Locality Plan

Scale (m) 0 500 1000 2000



2. BASELINE VISUAL ENVIRONMENT

2.1 Subject Site and Surrounding Context

The subject site is located on the western side of Airport Road, Narrabri and is a typically open grassed rural site, similar to those rural properties surrounding it. The site is approximately 3km south east of Narrabri Township. The site falls generally from south east to north west from approximately AHD 217m to AHD 215m.

2.1.2 Roads and Access

The subject site is accessed by one road, Airport Road which is a sealed local road that is adjacent to the east of the subject site and is aligned in a north south direction, connecting to the Narrabri Airport.

Kaputar Road is a local road that is south of the subject site and joins to Old Gunnedah Road which connects to the town of Narrabri in a north west direction.

2.1.3 Vegetation

The subject site has been cleared of vegetation except for a few scattered shrubs and specimen trees remaining which are scattered around the proposed Solar Farm. The local area in general is very sparsely vegetated, with some established vegetation along Airport Road verge to the east and the adjoining site to the north of the subject site being the most visible in the local area.

Generally vegetation to the east of the site, in the middle ground of viewshed is relatively dense. This forms a visual edge to the local catchment especially with the openness of the rural landscape. Further east the vegetated, elevated hills of Mount Kaputar National Park are visible which give further context to the site.

2.1.4 Structures

There are no structures on the subject site. There are a number of rural residential dwellings and industrial businesses around the subject site immediately to the south.

Higher density residential development (subdivisions) is located further toward Narrabri to the west.

2.1.5 Infrastructure

The subject site has power poles and lines running through it generally from east to west.

Apart from the roads mentioned above, the site is located to the south of the Narrabri Airport.

3. LANDSCAPE CHARACTER ANALYSIS

3.1 Regional Context

The landscape character of the region surrounding the site is flat to gently undulating, open rural lands used with a mix of pastoral and agricultural uses. Regionally, the site sits within the context of both rural, urban and natural areas.

3.2 Baseline Visual Character of Subject Site and Surrounds

The subject site is typical of the rural landscape character of the region in that it is open, gently undulating and typically grassed (minimal tree coverage). As the size of the site is small in the context of its surrounds, it utilises the 'borrowed landscape' of the adjoining rolling hills to define its visual context and define local views.

Although the overarching character of the landscape is rural, the urban areas of Narrabri and Narrabri West sit within the overall rural context rather than dominate it. To the east the landscape becomes more natural and less rural in character with the vegetated hills which are visible from the site.

4. PROPOSAL

4.1 Project Description

A full description of the proposal is provided within the main Statement of Environmental Effects and site plans, but a brief description is as follows. Section 4.1.1 identifies key elements of the proposal that are of particular relevance to an assessment of impacts on the visual analysis.

4.1.1 Indicative project Layout

The solar electricity generating facility will consist of the following elements:

- Solar array area of approximately 9 hectares within a total fenced area of approximately 13.3 hectares
- Solar array mounted on trackers (142 sets)
 - Rectangular photovoltaic module
 - Trackers area horizontal single-axis type
 - Solar array up to 2.6m high with +/-60° rotation angle
 - Trackers orientated north - south
- Associated infrastructure
 - Power Conversion Station (PCS)
 - Entry to the site via improved access from Airport Road
 - Security fencing
 - Car park area
 - Offload and hardstand area

During construction, temporary facilities located within the site may include:

- Construction office

4.1.2 Solar panel dimensions and arrangement

The proposed solar array module dimensions are approximately 1.1 m wide x 2.3m high. They are mounted on a tracking system that will maximise the electricity production. The tracking system rotates about a north-south axis to follow the sun with the aim of orienting each panel to be as close to perpendicular as possible to the incoming sun.

The tracking systems will be arranged in rows running in a north-south direction as indicated in **Figure 2**.

The diagram in **Figure 2.1** illustrates the dimensions and rotation of the panels. The panels only rotate from east to west and are not tilted toward the north.

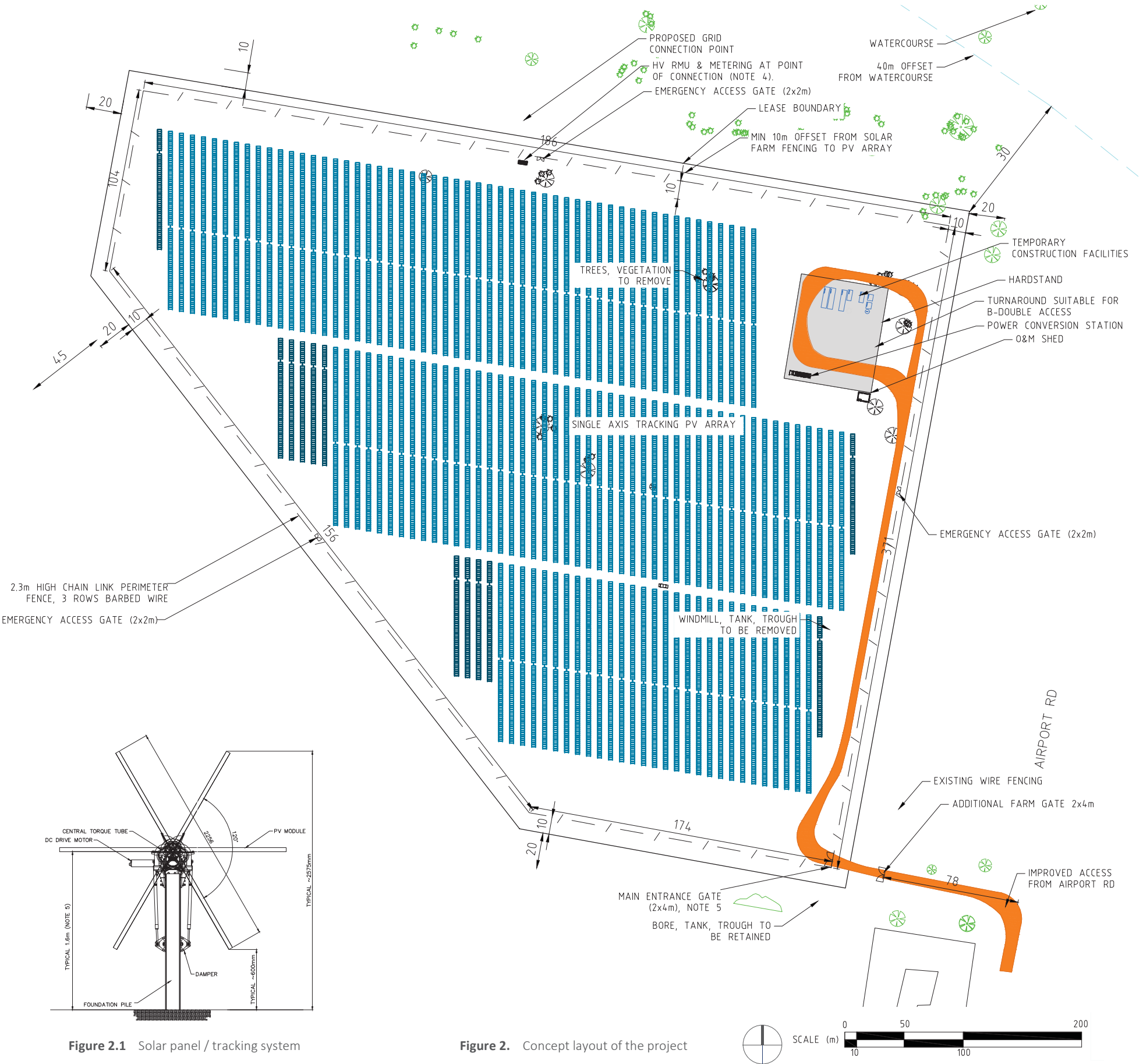


Figure 2.1 Solar panel / tracking system

Figure 2. Concept layout of the project

5. VISUAL IMPACT ASSESSMENT

5.1 Process

The Visual Impact Analysis generally applies the assessment techniques set out in the ‘Guidelines for Landscape and Visual Impact Assessment, Third Edition’ (2013) prepared by The Landscape Institute and the Institute for Environmental Management and Assessment (UK).

The analysis includes the following:

- Review of the proposal (scale, bulk, height, technical specifications and landscape);
- Analysis of the subject site (visual exposure, visual qualities and landscape values);
- Identification of potential impacts on key receptors including the rating of magnitude for each receptor group;
- Rating of impact significance for each receptor group.
- The significance is evaluated as a product of the sensitivity or value of the receptor, and the magnitude of impacts on the receptor;
- Potential mitigation measures to meet the necessary planning requirements and any community expectations;
- The report included a desktop analysis and a visual site investigation in November 2020. The desktop review included the review of aerial photography, site topography and vegetation cover;

Photo-montages were also prepared to inform the analysis.

5.2 Assessment of Visual Impacts for Key Receptors

Photographic imagery was taken of the site to assist in the assessment of visual impacts. Photos were taken with a Canon EOS 6D Mark II digital single-lens reflex (DSLR) camera with a 50 mm lens.

Three photomontage images were prepared to assist in the Visual Analysis process; all from public receptor points.

The five receptors used in the photomontage were selected to investigate a range of visual solutions and illustrating views from areas of perceived sensitivity. During the site investigation, local areas around the site were observed to determine the potential visibility of the proposed Solar Farm.

For the purposes of this Visual Analysis a Photomontage image was produced from each of the three viewpoints chosen. The approximate extent of the proposed Solar Farm has been identified to give a general impression of the location on site and the approximate height.

The Photo montage Images are represented in Section 5.8 and show the following overlays of information.

- Existing visual baseline (existing landform);
- Overlay of the final solar farm proposed development.

5.3 Receptor Sensitivity

The receptor sensitivity is derived from a combination of factors including:

- Receptors interest in the visual environment (high, medium or low interest in their everyday visual environment and the duration of the effect);
- Receptors viewing opportunity (prolonged, regular viewing opportunities); and
- Number of viewers and their distance/ angle of view from the source of the effect, extent of screening/ filtering of view.

Whilst the assessment of visual values and effects is largely measured on a qualitative basis, assessment against scale enables a more objective evaluation and comparison of sensitivity of receptors and magnitude of effects. The Receptor Sensitivity Rating is described as being High, Medium, Low or Negligible as described in **Table 1**.

5.4 Magnitude of Landscape Change

The Magnitude of Change to the landscape character depends on the nature, scale, intensity, extent and duration of the impacts/ change due to proposal. The magnitude of change also depends on the loss, change or addition of any feature to the existing landscape and is based on the character type that is most likely to be impacted by the project prior to the addition of any mitigation measures.

The Magnitude of Change is described as being High, Medium, Low or Negligible as described in **Table 2**.

Descriptions of Magnitude and Sensitivity are illustrative only and there is no defined boundary between levels of impacts.

Table 1. Receptor Sensitivity Rating

Receptor Sensitivity	Description
High	<ul style="list-style-type: none">• Visitors to heritage sites, regionally important locations, scenic routes, lookouts within 2.5km with quality views, important views of the site and surrounding areas where landscape is the specific focus.• High numbers of visitors• Views to landscape that are rare and or unique and are possibly vulnerable to change• Views from residences within 1km of the site or are representative of high quality views
Medium	<ul style="list-style-type: none">• Travellers/visitors along roads or rail routes that are not scenic routes but offer quality views within 2.5km of the site• Medium numbers of visitors/ residents (rural communities or townships)• Views that are representative of local character or sense of place but are not rare or unique• Views from residences beyond immediate vicinity (1km-5km) of the site or are representative of moderate quality views• Recreational users/ viewers beyond 2.5km from the site with moderate interest in their surrounds
Low	<ul style="list-style-type: none">• Travellers/visitors along roads or rail routes that are not scenic routes but offer reasonable views within 4km of the site• People at place of work where setting or views not important to quality of working environment• Recreational users not dependent on views or scenic quality of landscape• View experience takes in broad context with which site is visible but not an important element.• Small numbers of visitors with passing interest in their surroundings (those travelling along mid-level roads)• Viewers whose interest is not specifically focused on landscape or scenic qualities (commuters, workers)
Negligible	<ul style="list-style-type: none">• Very occasional or low level of users with passing interest in their surrounds (those travelling along minor roads or views from the air)• Travellers/visitors along unsealed roads offering views greater than 4km of the site

5.5 Impact of Significance on Landscape Character

The Impact Significance is evaluated according to 2 key criteria as noted above and is reflected in **Table 3**.

The rating is a means of comparing impacts on different receptors. Professional judgement and experience have been applied in order to identify the level of significance for each character type which has been assessed on its own merits.

- The sensitivity of the receptor or existing landscape; and
- The magnitude of the change or impact that is likely to occur.

The process of assessment and the use of the ratings tables reflect typical outcomes for visual impacts.

- Impacts on receptors that are particularly sensitive to change in views and visual amenity are more likely to be significant.
- Impacts that constitute a substantial change to the visual environment are likely to be more significant than the impacts that do not cause substantial change.

5.6 Summary of Potential Landscape Character Impacts

The following sheets summarise the assessment of impacts on each of the identified visual receptor groups.

Three representative viewpoints were identified where the site could be seen preferably from public locations. Due to the distances from the site, presence of topographic and vegetated features, surrounding structures and the limited views from publicly accessible areas, the choice of viable views was limited. The following sheets describe and rate the sensitivity of each viewpoint, the nature and magnitude of impacts likely to occur and the resultant significance of impacts for each receptor.

Typically views to the site from local roads and other public locations in the area were very limited. Photos from each receptor are provided and photomontages prepared to show how the proposed Solar Farm will be perceived from that particular viewpoint. Mitigation measures have been included where appropriate.

Table 2. Magnitude of Change

Magnitude of Change	Description
High	<div>Dominant Change</div> <ul style="list-style-type: none">Major change in view at close distances, affecting substantial part of the view continuously visible for a long duration or obstructing a substantial part or important elements of the viewOverwhelming loss or additional features in the view such as the nature of view or character of landscape fundamentally changedViews to key landscape features affectedVisual amenity of local residents or road users substantially diminishedSubstantial change to the landscape due to loss of and or change to elements, features or characteristics of the landscape creating an overall worsening of landscape quality
Medium	<div>Considerable Change</div> <ul style="list-style-type: none">Clearly perceptible changes in views at intermediate distances resulting in either distinct new element in a significant part of the view or a more widely ranging, less concentrated change across a wider areaSignificant loss or addition of features in the view, such that nature of view or character of landscape is alteredNoticeable contrast of any new features in the view such that the nature of the view or landscape character is changedNoticeable contrast of any new features or changes compared to existing landscapeViews to key landscapes partially obstructed but views remain intact
Low	<div>Noticeable Change</div> <ul style="list-style-type: none">Minor memorable change to the landscape or viewsTemporary or reversible impactLandscape dominant element and built form/ development well integrated within itLittle permanent change or no fundamental change to local landscape character
Negligible	<div>Barely Perceptible Change</div> <ul style="list-style-type: none">No memorable or rarely perceptible change to landscape character or key views

Table 3. Effect Significance Rating

Receptor Sensitivity	Magnitude of Change in Landscape				
		High (Dominant Change)	Medium (Considerable Change)	Low (Noticeable Change)	Negligible (Barely Perceptible Change)
	High	High	Moderate-High	Moderate	Minor-Moderate
	Medium	Moderate-High	High	Minor-Moderate	Minor
	Low	Moderate	Minor-Moderate	Minor	Minor-Negligible
	Negligible	Minor-Moderate	Minor	Minor-Negligible	Negligible

5.6.1 Selected Viewports



Figure 3. Selected Visual Receptors and Direction of View

5.6.2 Viewpoint 1 - Existing



Receptor - VP1	Airport Road, Narrabri
Coordinate Location	30°20'35.586" S 149°49'20.94" E
View Description	View from Airport Road looking north west toward the proposed solar farm site.
Distance from Site	Approximate 80m
Comments <ul style="list-style-type: none">Open rural landscape, with minimal canopy vegetation on site but existing vegetation to the east along Airport RoadNo hills or local topographic changes visible from this view	

5.6.3 Viewpoint 1 - Proposed



Receptor - VP1 Summary of Impact Assessment	
Receptor Sensitivity	Low
View Magnitude of Landscape Change	Low
Impact Significance	Minor
Mitigation Measures	<ul style="list-style-type: none">• Informal shrub planting (to a maximum height of 3m) adjoining lease boundary could integrate the solar array appearance into the landscape. This would be on the southern and south eastern sides of the solar farm to provide screening from residential properties and part of Airport Road.• No tree planting or formal shrub planting.

5.6.4 Viewpoint 2 - Existing



Receptor - VP2	Airport Road, Narrabri
Coordinate Location	30°20'3.528" S 149°49'26.958" E
View Description	View from Airport Road, looking south west towards the solar farm site
Distance from Site	Approximate 620 m
Comments <ul style="list-style-type: none">Open and gently undulating rural landscape character in the foreground with vegetated rural landscape in the background of the view. Prominent vegetation along Airport Road in the middle ground adjoining the site is visible.Roads and rail lines are visible in the foreground although not prominent.	

5.6.5 Viewpoint 2 - Proposed



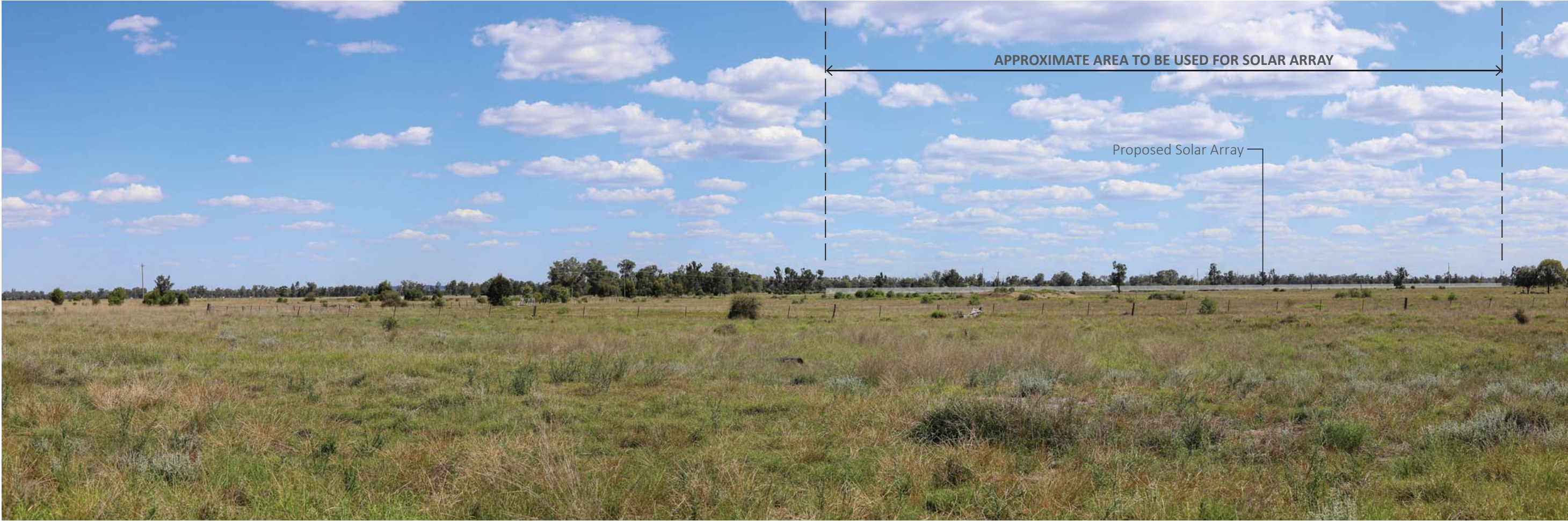
Receptor - VP2 Summary of Impact Assessment	
Receptor Sensitivity	Low
View Magnitude of Landscape Change	Low
Impact Significance	Minor
Mitigation Measures	<ul style="list-style-type: none">No mitigation required

5.6.4 Viewpoint 3 - Existing



Receptor - VP3	Airport Road, Narrabri
Coordinate Location	30°19'58.242" S 149°49'22.986" E
View Description	View from unnamed track which joins Airport Drive, looking south towards the solar farm site
Distance from Site	Approximate 700m to the edge of the site
Comments <ul style="list-style-type: none">Open rural landscape, with minimal canopy vegetation in the foreground with a sparsely vegetated rural landscape behind the site in the background that terminates most of the views.	

5.6.5 Viewpoint 3 - Proposed



Receptor - VP3 Summary of Impact Assessment	
Receptor Sensitivity	Low
View Magnitude of Landscape Change	Low
Impact Significance	Minor
Mitigation Measures	<ul style="list-style-type: none">No mitigation required

5.6.6 Viewpoint 4 - Existing



Receptor - VP4	Private access track, Narrabri
Coordinate Location	30°20'49.5" S 149°48'39.636" E
View Description	View from Kaputar Road, looking north east towards the solar farm site
Distance from Site	Approximate 1km
Comments <ul style="list-style-type: none">Open, flat rural landscape character with sparse vegetation coverage and rural residential dwellings to the south.Elevated vegetated hills in the background are elements of low prominence within the visible landscape.	

5.6.6 Viewpoint 4 - Proposed



Receptor - VP4 Summary of Impact Assessment	
Receptor Sensitivity	Negligible
View Magnitude of Landscape Change	Negligible
Impact Significance	Negligible
Mitigation Measures	<ul style="list-style-type: none">No mitigation required

6. SUMMARY OF ASSESSMENT

6.1 Summary of Assessment

The visual environment for the subject site and surrounding area is characterised by open, typically flat rural land.

Whilst the subject has been cleared of vegetation, established specimens and groups of trees on adjoining properties reinforce the local rural character of the area.

Although the subject site is located within 3km of Narrabri township, views of the site from public viewpoints are only generally visible along Airport Road and Kaputar Road. This is due to the low flat areas adjoining the site and obstructions between the viewpoints and the site such as residential structures and vegetation along verges and property boundaries.

Although the site is visible from adjoining roads, from certain locations it’s distance from viewpoints along the roads combined with the presence of existing vegetation reduces its overall visibility within the landscape.

The height and visual permeability of the array will mean that the relative visual impacts of the Solar Farm are generally low, especially given the distance from the most notable public vantage points.

As the landscape view shed from the 4 nominated viewpoints are considered to be wide, the proposed solar farm would not be a prominent element in the landscape nor would it change the existing rural character.

Overall the Solar Farm is considered to have an Effect Significance rating of **Minor**.

6.2 Mitigation Measures

As described in the summary for each of the 4 viewpoints, the height and nature of the solar farm along with the distances from the site will mean that it will not be a highly visible element within the landscape. However as it represents a minor visual change to the rural landscape some mitigation would be recommended on those sides that are visible from the main public viewpoints and the adjoining private receptors of the residential properties.

Given the relatively low height of the Solar Farm, the informal planting of native shrubs to compliment the existing rural landscape character along the southern and south eastern side of the lease area, outside of the fence line would assist in minimising visual impacts of the development on the surrounding rural landscapes and the adjoining residential properties.

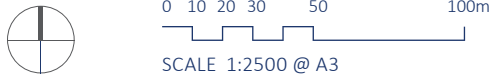
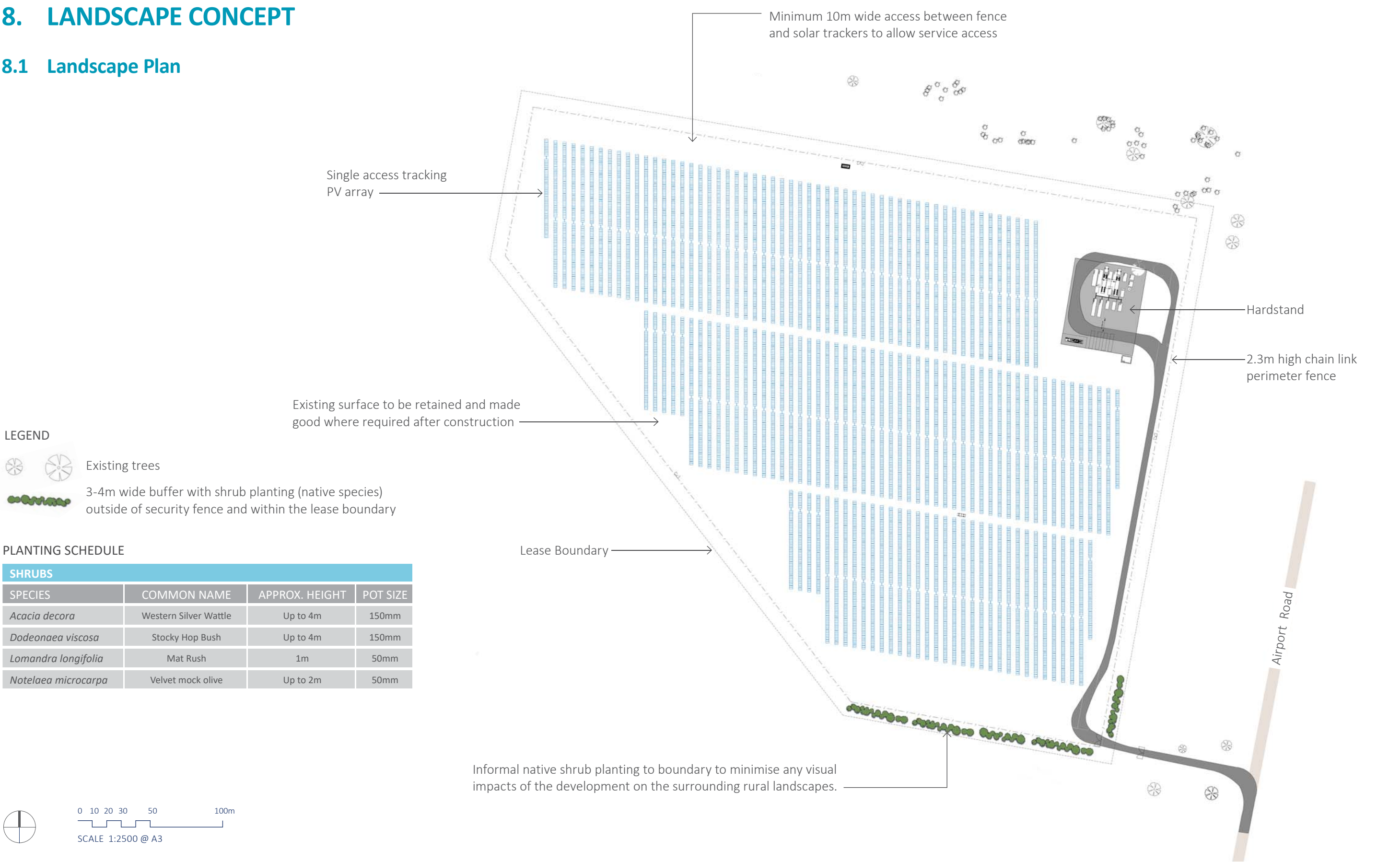
The planting of trees directly adjoining the solar farm would not be encouraged due to the potential for shadows to be cast over the array during certain times of the day.

Table 4. Summary of Visual Impact Ratings for each Receptor

Receptor	Receptor Sensitivity	Magnitude of Change	Effect Significance
VP1	Low	Low	Minor
VP2	Low	Low	Minor
VP3	Low	Low	Minor
VP4	Negligible	Negligible	Negligible

8. LANDSCAPE CONCEPT

8.1 Landscape Plan



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