Early Works Strategy

Early Works Strategy

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Prepared by

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1.0 Introduction

1.1 Site Context

AECOM Australia Pty Ltd has prepared a planning permit application on behalf of 892 Yarrawonga Development Pty Ltd (South Energy) (the Applicant) for the construction of a solar farm facility on land adjacent to Benalla-Yarrawonga Road and Lake Mokoan Benalla, Victoria. The site and lot address are presented in Table 1.

Table 1 Site Addresses within the development

Site Address	Formal Land Description
892 Benalla-Yarrawonga Road, Goorambat Benalla-Yarrawonga Road, Benalla Crown Land 616 Benalla-Yarrawonga Road, Benalla Road reserves of Lake Mokoan Road and Benalla-Yarrawonga Road Stockyard Creek	Lot 1 PS625748F Lot 1 TP173518C Lot 1 TP104377 98B PP2704 Lot 1 LP206524H Lots 2-5 LP206524H Lot 1 TP576184

The land is currently used for broadacre farming, located within a Farming Zone (FZ), in accordance with the Benalla Planning Scheme. It is located approximately 5 kilometres north-east of the town centre of Benalla, and approximately 8 kilometres south-east of the township of Goorambat.

1.2 Scope of Work

The purpose of this Early Works Strategy is to describe the potential impacts associated with development of the solar farm and outline the strategies to mitigate, minimise and manage any impacts.

The scope of this Early Works Strategy is to:

- Summarise potential impacts identified in the Glint and Glare Assessment (prepared by AECOM Australia Pty Ltd, dated 26 August 2021)
- Summarise potential impacts identified in the Landscape and Visual Impact Assessment (prepared by AECOM Australia Pty Ltd, dated 22 April 2021)
- Outline the proposed mitigation measures
- Present details for implementing mitigation measures.

2.0 Summary of Impacts

2.1 Glare Impacts

The Glint and Glare Assessment (AECOM, 2021) identified observation points and route receptors for the solar farm. The observation points and route receptors are considered to be potential areas where glare could impact residents or drivers within or close to one kilometre of the solar farm.

Figure 1 identifies the observation points (red), route receptors (blue lines) and the solar farm array areas (blue areas) considered in the assessment.

The Glint and Glare Assessment found that a number of observation points and route receptors are predicted to experience glare with moderate potential for after image during various times of the day. Table 2 identifies these observation points and route receptors.

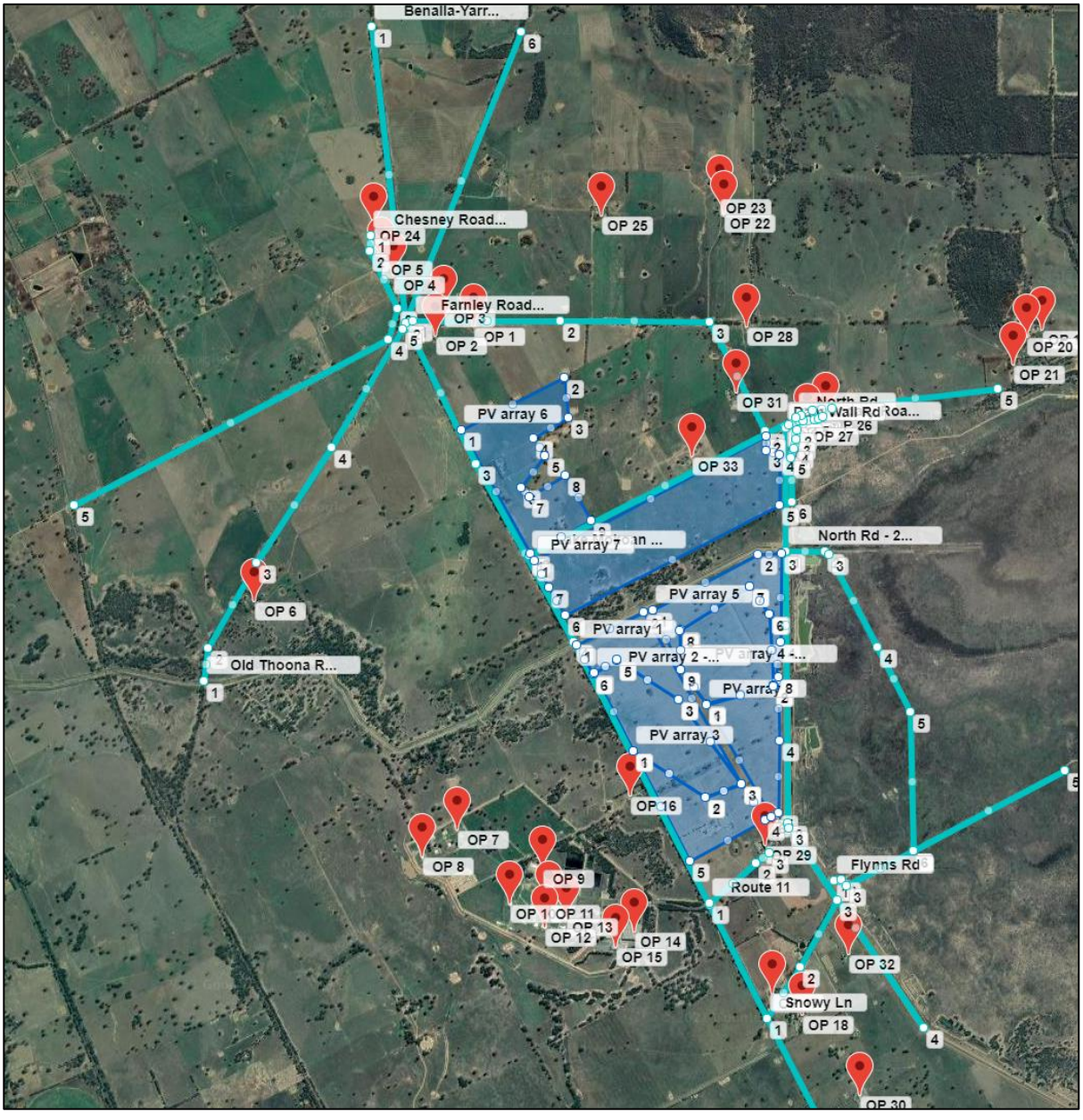

Figure 1 Observation points and route receptors analysed
Source Glint and Glare Assessment, Figure 4 (prepared by AECOM Australia Pty Ltd, dated 7 May 2021)

Table 2 Observation points and route receptors predicted to experience glare

Observation Point/Route Receptor	Approximate minimum distance to site	Observation Point/Route Receptor	Approximate minimum distance to site
Lake Mokoan Road	Adjacent to the site	OP 11	1,060
Benalla-Yarrawonga Road	Adjacent to the site	OP 21	1,180
Boundary Road	Adjacent to the site	OP 20	2,075
OP 33	Adjacent to the site	OP 1	630
OP 16	165	OP 2	695
North Rd - 2	Adjacent to site	OP 28	725
OP 7	1,465	OP 19	2,185
Dam Wall Rd	Adjacent to the site	OP 13	1,000
OP 27	295	OP 3	865
OP 9	1,015	OP 12	1,185
OP 8	1,700	Chesney Road	935
OP 26	465	OP 4	1,245
Farnley Road	35	OP 24	1,640
North Rd	Adjacent to the site	OP 6	1,985
Flynns Rd	Closest end of Road starts approximately 600 m from site	OP 29	175
OP 10	1,335	Route 11 (unnamed private driveway)	200
OP 31	345	Old Thoona Road	750

2.2 Visual Impacts

The Landscape and Visual Impact Assessment (AECOM, 2021) identified a selection of representative viewpoints surrounding the proposal site were used to assess the visual impact from key locations within the study area. The viewpoints are included at Figure 2 and include:

- Viewpoint 1: Benalla-Yarrawonga Road North
- Viewpoint 2: Lake Mokoan Road
- Viewpoint 3: Benalla-Yarrawonga Road Mid
- Viewpoint 4: Benalla-Yarrawonga Road South
- Viewpoint 5: South Eastern Proposal Boundary
- Viewpoint 6: Dam Wall Hiking Trail South
- Viewpoint 7: Dam Wall Hiking Trail Mid
- Viewpoint 8: Dam Wall Hiking Trail North
- Viewpoint 9: Farnley Road East
- Viewpoint 10: Farnley Road West
- Viewpoint 11: 81 Lake Mokoan Road

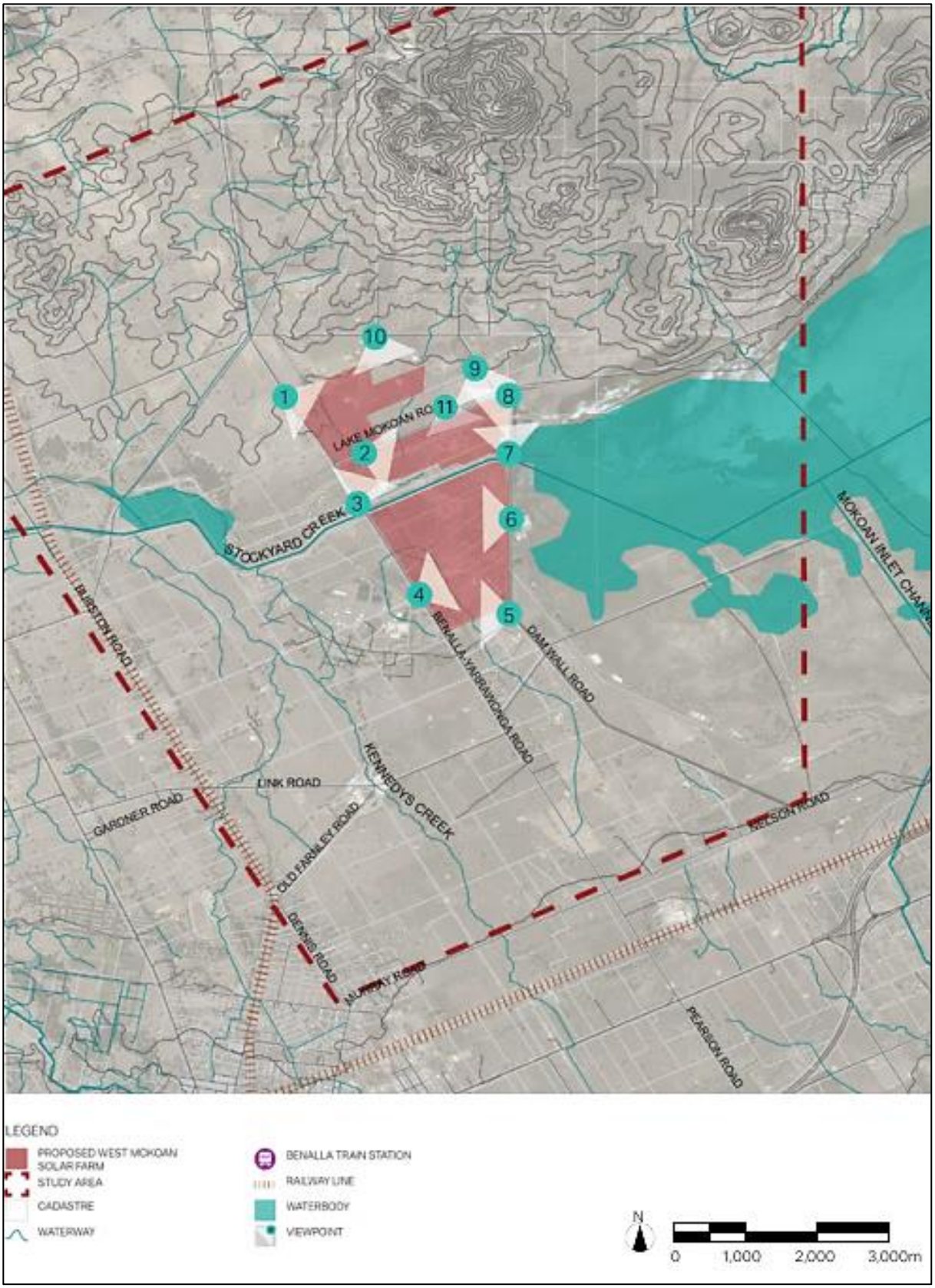

Figure 2 Representative viewpoints selected to assess visual impact of the proposal
Source Landscape and Visual Impact Assessment, Figure 43 (prepared by AECOM Australia Pty Ltd, dated 22 April 2021)

The Landscape and Visual Impact Assessment found that:

- Few opportunities for viewing long distances exist surrounding the proposal as a result of the topography of the area being flat. Sporadic bands and stands of trees and fully structured vegetation (i.e. trees, shrubs and groundcovers) within paddocks, lining the road corridors and along boundary fences and creek lines also limit the opportunity for distance views.
- The dam wall adjacent to the Winton Wetlands is an exception to this where there is a recreational hiking trail positioned on top of the wall which offers views to the surrounding landscape from an elevated position. This trail passes directly adjacent to the proposal, resulting in uninterrupted views to the site.
- The Dam Wall Hiking Trail and two residences adjacent to the proposal viewpoints had the highest overall ratings.
    - Recreational receptors are very sensitive due to the reliance of the surrounding landscape for enjoyment of the recreational experience of hiking and cycling. This group's view of the proposal would change often due to the shot time periods spent viewing the proposal at a time, from a short distance away.
    - Residential receptors are sensitive due to proprietary interest in views from their properties, however, there are a low number of residential receptors surrounding the proposal.
- Roadways surrounding the proposal received moderate ratings and Lake Mokoan Road (running through the proposal) returned a high to moderate rating. This is due to the close proximity between passers-by and the proposal which would be somewhat mitigated in the boundary road by proposed landscaping.
- Other residences had a relatively low visual impact based on their position away from the proposal or due to existing screening vegetation that either partially or fully screened views to the proposal from these residences. Proposed landscaping along the proposal boundary would further screen views to solar infrastructure from these receptors.
- The proposal is considered to have visually comparable elements to industrial and agricultural sites scattered throughout the landscape and is therefore considered consistent with the land use zones. Further, a solar farm could be of interest to some people or be considered a local landmark with benefits such as eco-tourism.

Table 3 identifies the viewpoints, their sensitivity, magnitude, and overall rating.

Table 3 Visual impact for viewpoints

Viewpoint	Sensitivity	Magnitude	Overall Rating
Viewpoint 1: Benalla-Yarrawonga Road North	Moderate	Moderate	Moderate
Viewpoint 2: Lake Mokoan Road	Moderate	High	High to Moderate
Viewpoint 3: Benalla-Yarrawonga Road Mid	Moderate	Moderate	Moderate
Viewpoint 4: Benalla-Yarrawonga Road South	Moderate	Moderate	Moderate
Viewpoint 5: South Eastern Proposal Boundary	High	High	High
Viewpoint 6: Dam Wall Hiking Trail South	High	High	High
Viewpoint 7: Dam Wall Hiking Trail Mid	High	High	High
Viewpoint 8: Dam Wall Hiking Trail North	High	High	High
Viewpoint 9: Farnley Road East	Moderate	Low	Moderate to Low
Viewpoint 10: Farnley Road West	Moderate	Moderate	Moderate
Viewpoint 11: 81 Lake Mokoan Road	High	High	High

2.3 Mitigation Measures

Table 4 outlines the mitigations measures provided in the Glint and Glare Assessment and the Landscape and Visual Impact Assessment.

Table 4 Summary of Impacts and Mitigation Measures

Impact	Mitigation Measure
Glare	
Glare with moderate potential for after image to a number of observation points and route receptors	Dense screening (10m wide planting zone) is to be planted on the: • South western boundary of the southern array • North eastern boundary of the array • Parts of the boundary between the array and Lake Mokoan Road.
	Intermittent screening (5m wide planting zone) is to be planted on: • Parts of the southern array's western boundary • Most of the array's eastern boundary • The remaining boundary between the array and Lake Mokoan Road.
	Infill planting (additional trees and shrubs to increase density of planting and provide a dense screen) is to be planted on the western boundary of the northern array where existing vegetation is already well established.
	Shade cloths or glare screens on the site's proposed security fences to help interrupt the line of vision between the solar installation and points of interest that may be affected by glare prior to vegetation establishment.
	Limiting the resting angle to a minimum of 14 degrees during backtracking operation.
Visual	
Stockyard Creek vegetation is seen as a backdrop of trees from several locations	Preserve existing vegetation and provide additional planting of indigenous trees and shrubs along the southern boundary of the proposal.
Elevated views from the Dam Wall Hiking Trail	Provide screening along the eastern boundary of the proposal, and bands of internal screening vegetation to visually break up the development when viewed from this recreational trail. Tree planting along the boundary to be intermittent, with informal groupings of trees to allow occasional views across the proposal site for interest. Utilisation of plant species from indigenous vegetation communities to reinstate 'native' plant associations.
A number of residences to the north and south of the site would potentially obtain views of the proposal.	Provide targeted fully structured vegetation (i.e. trees, shrubs, grasses and groundcovers) to screen the solar infrastructure from these locations. Utilisation of plant species from indigenous vegetation communities to reinstate 'native' plant associations.

Impact	Mitigation Measure
The proposal would be visible from a number of roads, including Benalla-Yarrawonga Road, which is part of the Silo Tourist Trail, and Lake Mokoan Road (also part of the tourist trail) where the proposal would lie on either side of the road corridor.	Informal screening vegetation comprising scattered eucalypt trees and occasional shrubs, with an understorey of pasture grass would provide effective partial screening of the proposal, while still maintaining the open, partly compartmentalised rural character. Targeted dense planting could be used to completely screen views from more sensitive locations such as nearby residences. Provide informal planting along the road corridor to provide some screening, while still allowing views through to the solar infrastructure. Provide some internal screen planting to limit the seen amount of solar infrastructure to smaller paddocks.
Existing screen planting surrounding the site provides screening from some locations. Existing paddock trees within the site visually compartmentalise the site and would reduce the seen area of the proposal from any viewpoint.	Conserve screen planting and other vegetation on and surrounding the site, where practicable.

3.0 Implementation and Timing

3.1 Mitigation Extent

Figure 3 shows the Landscape Concept Plan which has been prepared, seeking to mitigate glare and visual impacts resulting from the solar farm.

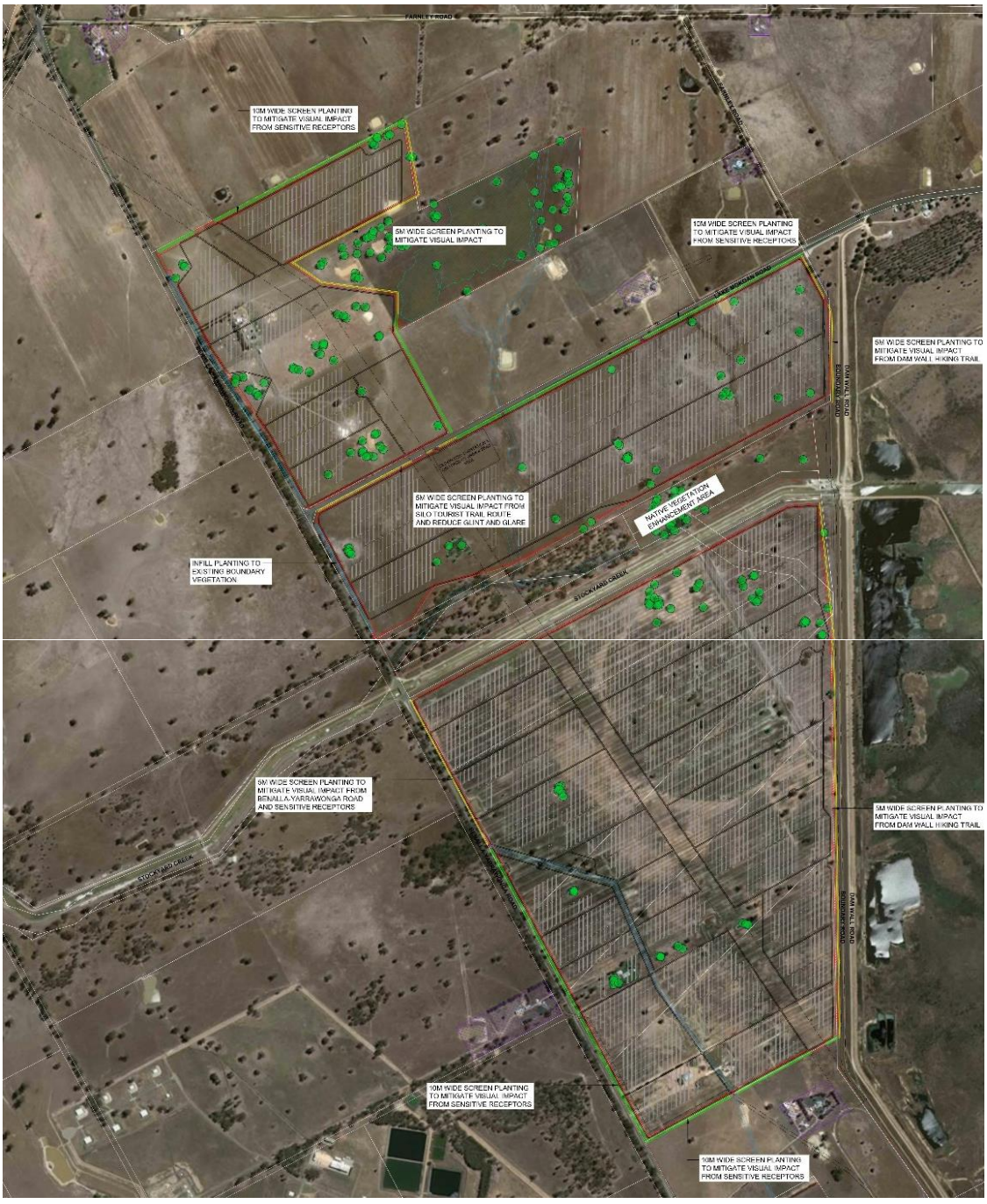

Figure 3 Landscape Concept Plan

The Plan proposes:

- **10m Wide Planting Zone: Dense Screening (Targeted)**

  Dense screening with groups of trees and shrubs along boundaries to limit views of the site from surrounding sensitive receptors.

- **5m Wide Planting Zone: Intermediate screening (Typical)**

  Clusters of trees to reduce the impact of Glint and Glare from the solar farm development and lower visual impact from temporary passing visitors including tourists and workers.

- **Infill Planting to Existing Vegetation**

  Additional trees and shrubs to increase density of planting and provide a dense screen to adjacent sensitive receptor.

The Plan above shows the ultimate outcome of landscaping works. In recognising that the final intended outcome of landscaping works could take 5 years to grow before being able to effectively mitigate visual impact of glint and glare and up to 10 years to mature, a Landscape Early Works Plan has been prepared which proposes the targeted plant installation preceding construction of the internal solar farm. This would allow for an advanced vegetation screening system present at the time of construction of the wider solar farm. Figure 4 shows the Landscape Early Works Plan.

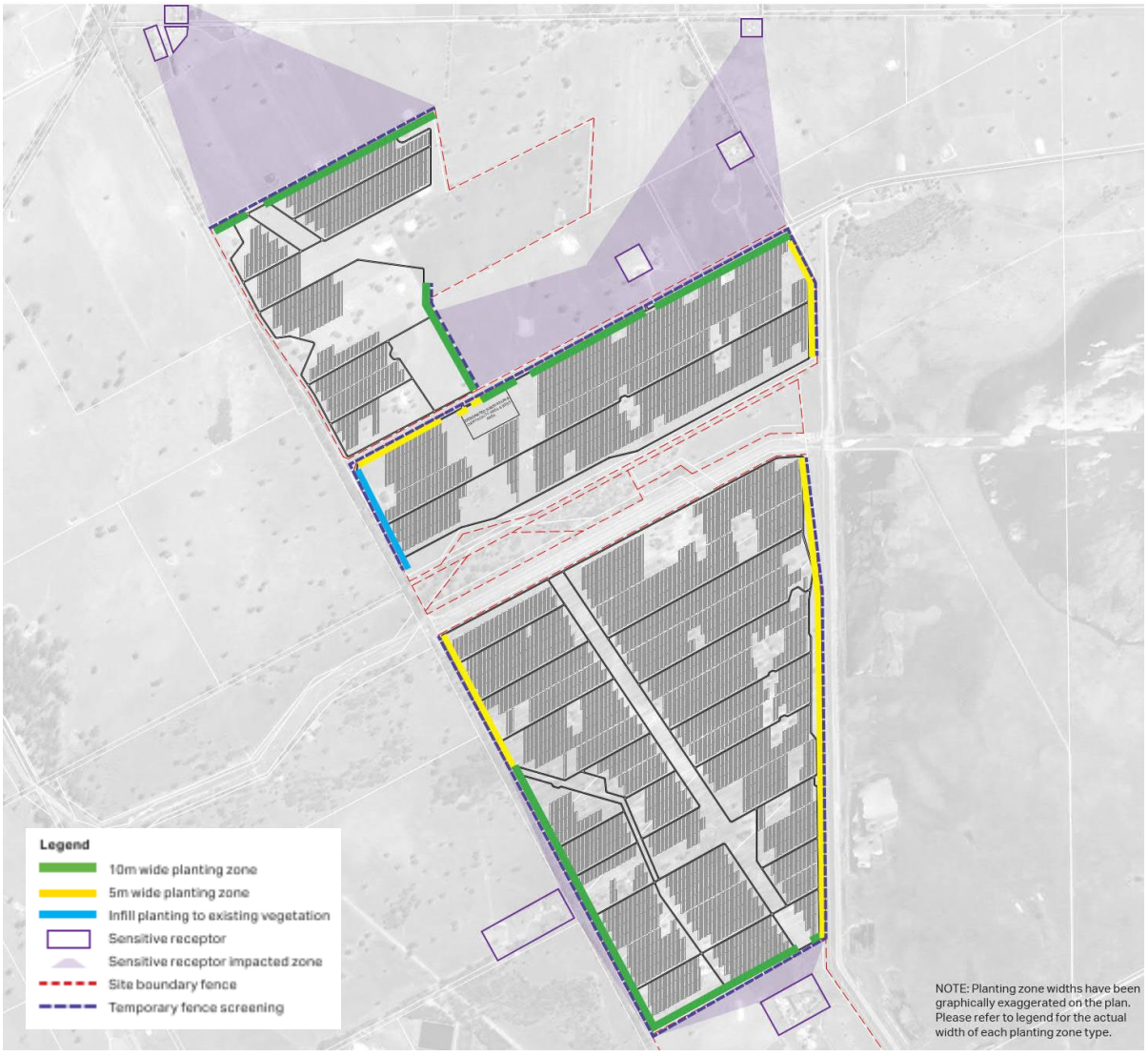

Figure 4 Landscape Early Works Plan

The Early Works Plan proposes:

- **10m Wide Planting Zone: Dense Screening (Targeted)**

  Tube stock planting of groups of trees and shrubs at moderate densities along boundaries that can be seen from surrounding sensitive receptors.

- **5m Wide Planting Zone: Intermediate screening (Typical)**

  Clusters of trees to reduce the glare from the solar farm site to Benalla-Yarrawonga Road, Boundary Road, Lake Mokoan Road and Boundary Road.

- **Infill Planting to Existing Vegetation**

  Additional trees to be planted between existing vegetation to reduce the glare from the solar farm site to Benalla-Yarrawonga Road.

The installation of these works will soften the visual impacts during both construction and at completion. The installation of all early works planting from tube stock will require an intensive maintenance regime during the first 18 months of establishment, including irrigation, weeding, fertilizer and general plant maintenance.

It is anticipated that the remaining works as identified in the Landscape Concept Plan will be installed at a later date to align with the construction of the solar farm.

3.2 Project Timeline

3.2.1 Landscape Early Works

Works are to occur as early as possible, preferably a minimum of 6 to 12 months prior to construction of solar infrastructure. Landscape zones and planting extents are shown in Figure 4.

Planting stock: The source of plant stock is to be established to determine availability and timeframe for supply of tube stock plants. Plant material are to be supplied in accordance with AS 2303:2018 – Tree stock for Landscape Use. Sample stock is to be inspected prior to installation to ensure quality. Plants shall not exhibit signs of stress at any stage during their development including inadequate watering, excessive shade or sunlight, or restricted growth.

Site preparation and access: The site perimeter is to be established and landscape planting zones marked out. It is assumed that construction vehicles will use the designated access tracks as set out in the concept design with three site access points along Lake Mokoan Road and two along Benalla-Yarrawonga Road.
If larger/alternate access points are projected, landscape works to affected areas should not be planted until such a stage that construction activities will not impact establishment.

Early works protection: Planting zones are to be protected with temporary fencing to restrict access and animal grazing. Tree protection zones and tree protection fencing are to be established around site access points to minimised potential impacts to trees from the works.

Maintenance: A maintenance program is to be established to ensure successful establishment of vegetation. This is to occur for a minimum of 18 months and include at a minimum:

- Watering methodology and frequency,
- Removal of weeds,
- Clipping and pruning to maintain form, growth, and removal of dead wood,
- Spraying to maintain plants free of pests and fungi,
- Replacement of failed, damaged, or stolen plants, and
- General plant maintenance.

Maintenance work shall include site visits and inspections of the landscape at regular intervals, and more often in hot and dry periods. It is recommended for the maintenance program to be developed with assistance of contractors that possess local knowledge.

Planting establishment: Plants should be planted immediately after delivery to the site or stored appropriately ensuring sufficient watering and shelter. Planting is not to occur in unsuitable weather conditions such as extreme heat, cold, wind, or rain. Suspend excavation when the soil is wet or during frost periods to prevent compaction.

Planting design, densities and quantities have been prepared based on survey data. The contractor is to adjust planting densities on site to respond to batter slopes (embankments, river edge, etc). The contractor is to ensure planting quantities documented are applied to the full extent of all planting areas.

3.2.2 Main Site Infrastructure Construction

It is anticipated to take five years for the proposed vegetation screening to reach three and a half metres in height. During the period when the vegetation is growing to a sufficient height, either of the following options can be implemented:

A. Install manmade screening (shade cloth, glare screen or non-transparent security fence) on the site's security fence at three and a half metres high (noting that the existing security fence would need to increase in height to support this screening), OR

B. Limit the resting angle of the solar panels to a minimum of 14 degrees during backtracking operation.

The current preference is to restrict the resting angle to 14 degrees, however both options are able to mitigate the impacts of possible glint and glare until vegetation screening reaches the required height of three and a half metres.

If screening is chosen, shade cloth attached to the proposed site boundary fencing is the preferred type of screening due to ability to minimise visual impact to sensitive receptors and glare from infrastructure prior to the establishment of plant boundaries. Shade cloth is to be made from a material with low visible light transmission (blocking 95% of sunlight or more). If a separate fence is required to the site boundary fence the material is to be non-transparent, recessive in the landscape, and a minimum of three and a half metres high.

Table 5 Possible temporary screening types

Temporary screening type	Example
Shade cloth attached to security fencing	

Temporary screening type	Example
Glare screen *not effective to screen from sensitive receptors	
Non-transparent security fence	
Construction hording	

3.3 Vegetation Requirements

The Plan considers that all plants would be installed as tube stock, as plants installed at this size become more quickly acclimatised to the soils and environmental conditions and would result in a strong maturing screening for the site. The Plan has also selected native plant species in consultation with local community groups. These have been selected to help preserve endangered local bird species and to retain the existing character of the area.

3.3.1 Planting zones

10m Wide Planting Zone: Dense Screening (Targeted)

- 10 metres wide from the fence line of the site in varying lengths (refer to the Landscape Concept Plan, Figure 3).
- Each 10m x 10m area includes 4 trees and 20 shrubs
  - Trees planted in groups of 1, 3, or 5No. of the same species

- Groups of shrubs consolidated into the central 5m of the zone to provide a dense screen

- The trees and shrubs are clustered in the centre of the planting zone to provide a dense screen to the perimeter of the site, where proposed.
- The planting is proposed to be installed as tube stock. 2 years post installation trees are expected to be up to 2 metres tall and shrubs between 50-75% of mature height. Ten years post installation trees are expected to have reached 60% of mature height and shrubs have reached maturity.

  Note: Tree growth height projections assumes ideal installation method, climatic conditions and maintenance regimes.

5m Wide Planting Zone: Intermediate screening (Typical)

- 5 metres wide from the fence line of the site in varying lengths (refer to the Landscape Concept Plan, Figure 3).
- Each 5m x 20m area includes 3No. trees
  - Trees planted in groups of 1No. or 3No. of the same species.
- The planting is proposed to be installed as tube stock. Two years post installation, trees are expected to be up to 2 metres tall. Ten years post installation, trees are expected to have reached 60% of mature height.

  Note: Tree growth height projections assumes ideal installation method, climatic conditions and maintenance regimes.

3.3.2 Plant establishment and screening requirements

Tube stock plants will take time to establish into a solid landscape screen on site. The following identifies expected heights and widths (canopy density) from time of installation. Establishment heights are approximate and will be dependent on weather conditions and timing (e.g. intensive watering required over hot periods for initial establishment period).

Two years post installation

Two years after plantation the plants will have undergone the extensive maintenance period and developed a sustaining root system. Trees are expected to be up to 1-2 metres tall and shrubs between 50-75% of mature height.

Figure 5 and Figure 7 illustrate 30m long extents of the dense and intermediate screening zones two years after installation of tube stock planting.

Figure 6 and Figure 8 illustrate the screening zones two years after installation of tube stock planting with the security fence and indicative shade cloth behind.

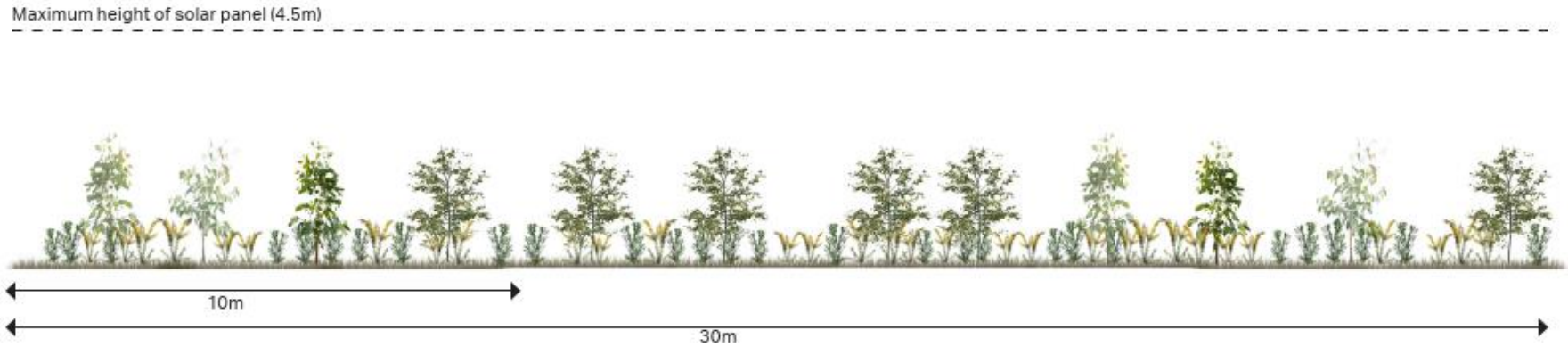

Figure 5 Typical 10m wide screening section - 2 years post installation

Figure 6 Typical 10m wide screening section - 2 years post installation showing security fence with indicative shade cloth behind

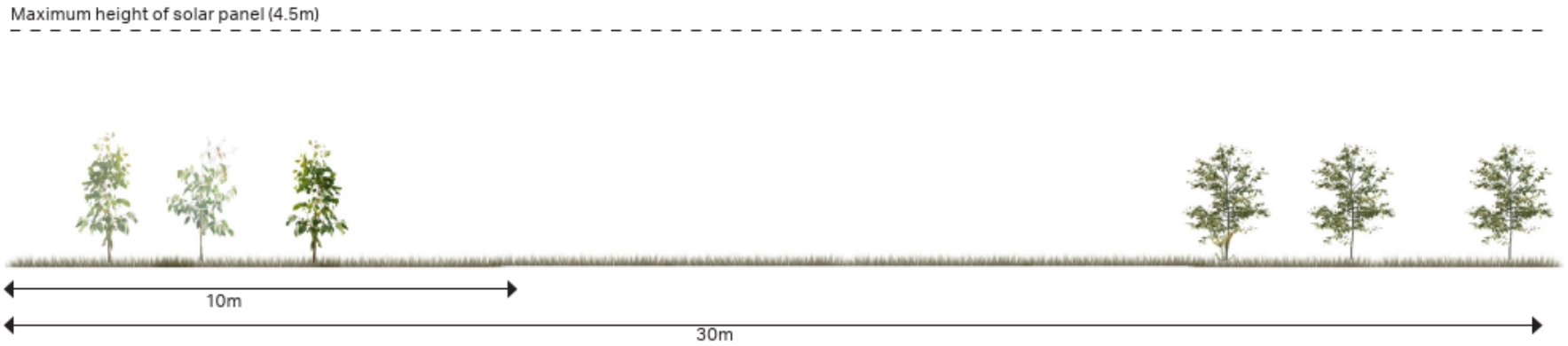

Figure 7 Typical 5m wide screening section - 2 years post installation

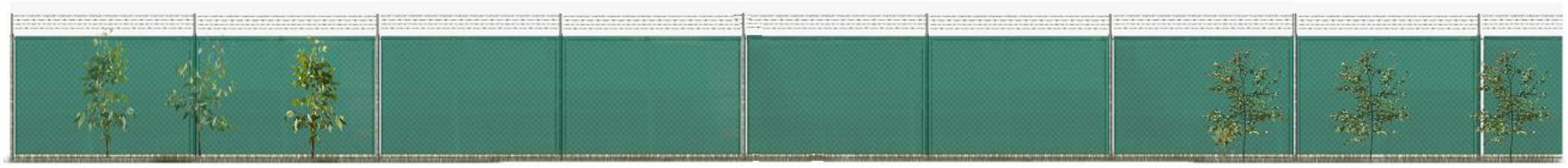

Figure 8 Typical 5m wide screening section - 2 years post installation showing security fence with indicative shade cloth behind

Five years post installation

Shrubs are expected to reach maturity between 3-5 years post planting, dependent of species. As shown in Table 6, the selected shrub species will provide an adequate three and a half metre high screen when established, allowing mitigation measures to be removed.

Table 6 Shrub species list

Botanical Name	Common Name	Mature size H(m) x W(m)
Acacia acinacea s.l.	Gold-dust Wattle	3 x 2
Acacia paradoxa	Hedge Wattle	4 x 2
Acacia pycnantha	Golden Wattle	5 x 2
Bursaria spinosa	Sweet Bursaria	4 x 3
Melaleuca parvistaminea	Rough-barked Honey-myrtle	4 x 5
Callistemon sieberi	River Bottlebrush	5 x 4

Trees will take longer than shrubs to reach their mature size, in the initial years' growth is focused on root and structural formation. As shown in Table 7, estimated tree heights 5 years post installation are approximately 2-4 metres high depending on species. The trees will be saplings and experiencing a period of rapid growth, they will start to increase significantly in height as they begin to mature.

Table 7 Tree species list

Botanical Name	Common Name	Estimated 5 years post installation H(m) x W(m)	Mature size H(m) x W(m)	Growth rate
Eucalyptus melliodora	Yellow Box	2-3 x 1	15 x 10	Medium
Eucalyptus microcarpa	Grey Box	1.5-2 x 0.75	25 x 15	Medium
Allocasuarina luehmannii	Buloke	1-2 x 0.75-1	8 x 4	Slow
Eucalyptus albens	White Box	2-3 x 1-1.5	25 x 15	Medium
Eucalyptus camaldulensis	River Red Gum	3-4 x 1.5	20 x 15	Medium

Ten years post installation

Ten years post installation trees are expected to have reached 60% of mature height and shrubs have reached maturity. Figure 9 and Figure 12 illustrate 30m long extents of the dense and intermediate screening zones 10 years after installation of tube stock planting and Figure 11 and Figure 14 illustrate typical plans of the dense and intermediate screening zones 10 years after installation of tube stock planting. Figure 10 and Figure 13 illustrate the screening zones 10 years after installation of tube stock planting with the security fence and indicative shade cloth behind.

Note: Tree growth height projections assumes ideal installation method, climatic conditions and maintenance regimes.

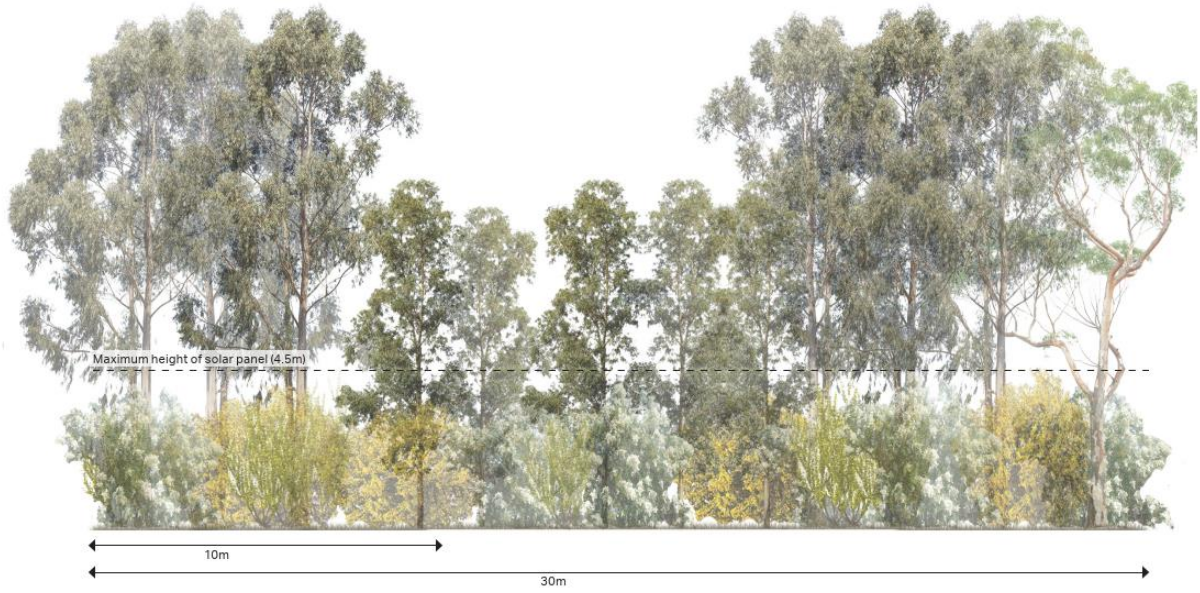

Figure 9 Typical 10m wide screening section - 10 years post installation

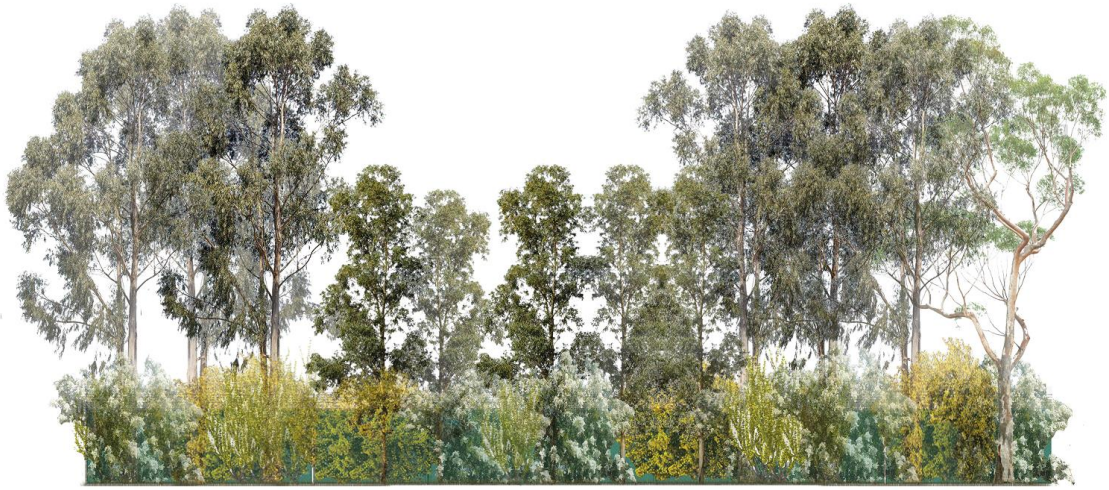

Figure 10 Typical 10m wide screening section - 10 years post installation showing security fence with indicative shade cloth behind

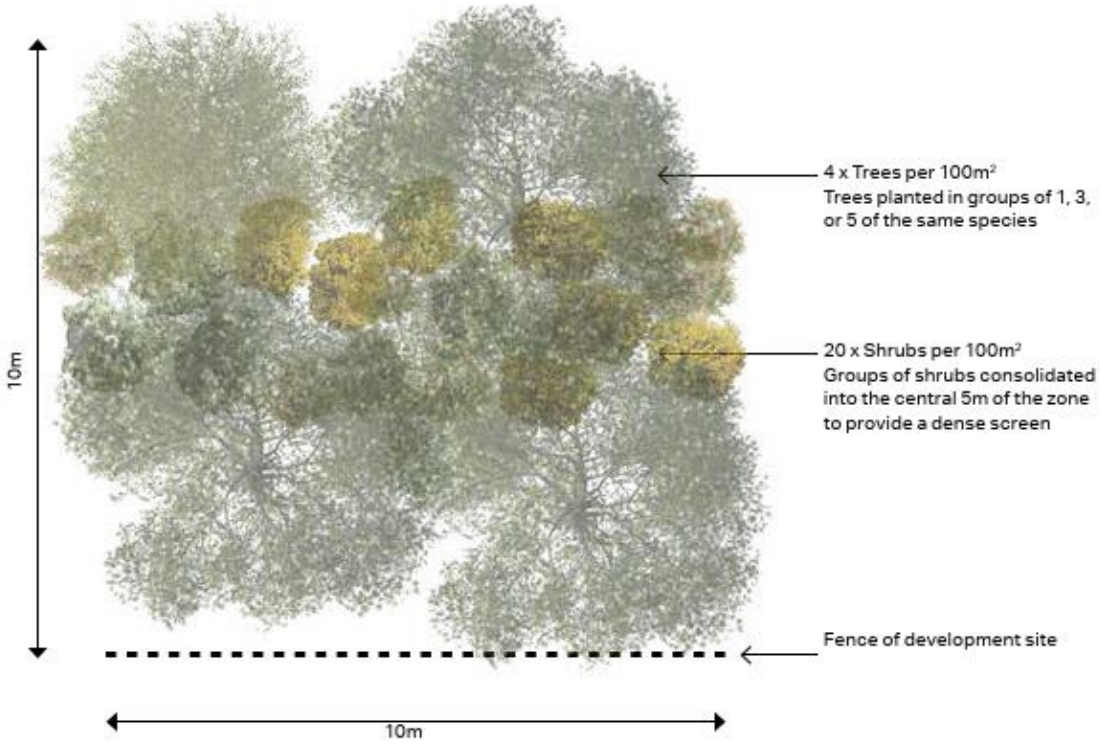

Figure 11 Typical 10m wide screening plan - 10 years post installation

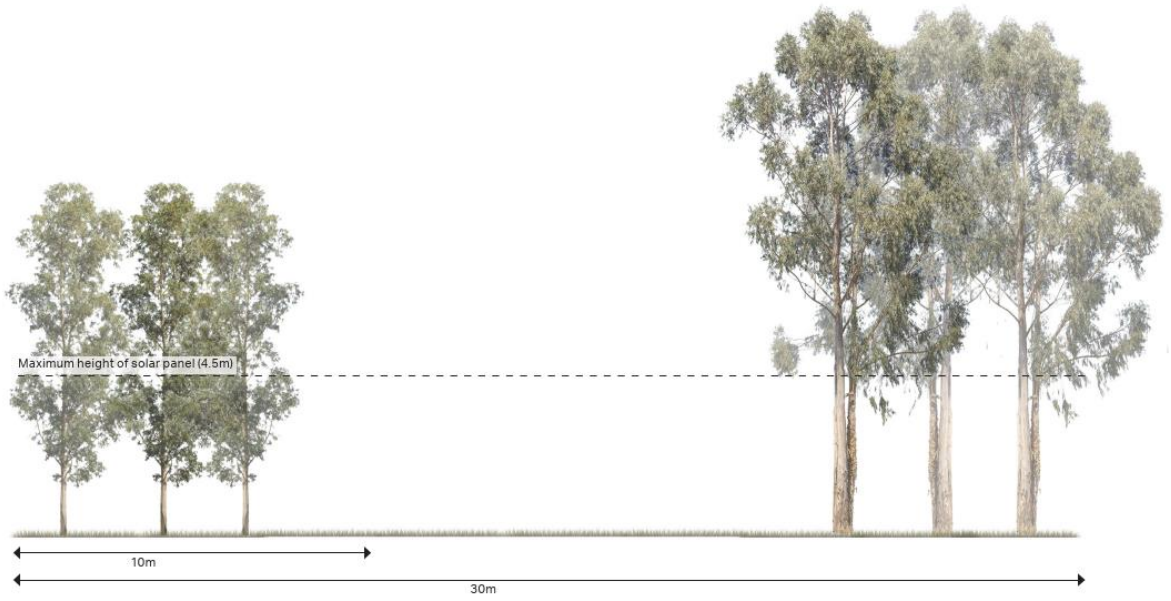

Figure 12 Typical 5m wide screening section - 10 years post installation

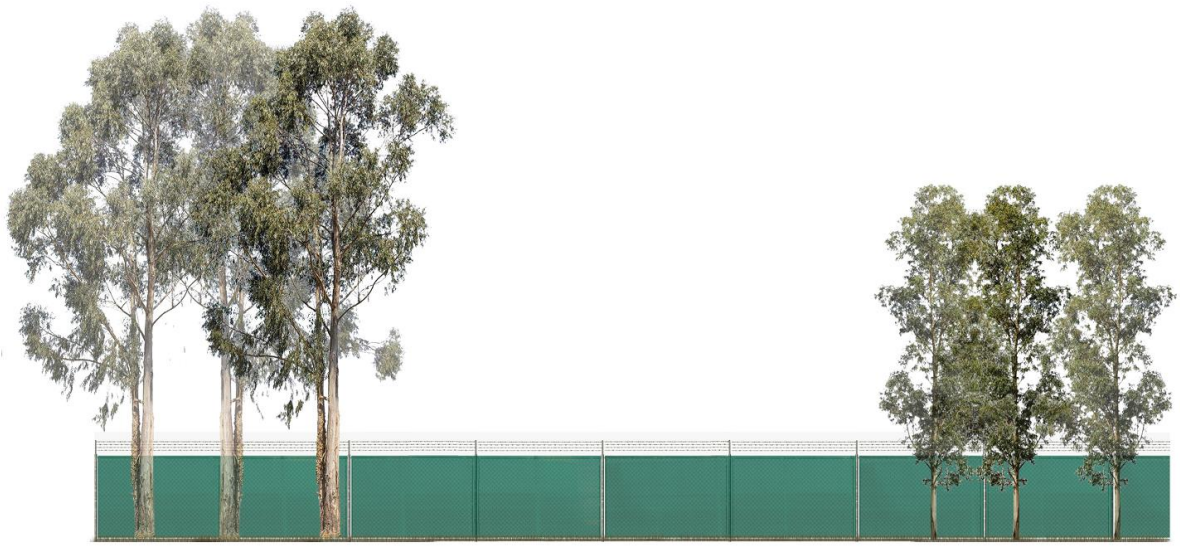

Figure 13 Typical 5m wide screening section - 10 years post installation showing security fence with indicative shade cloth behind

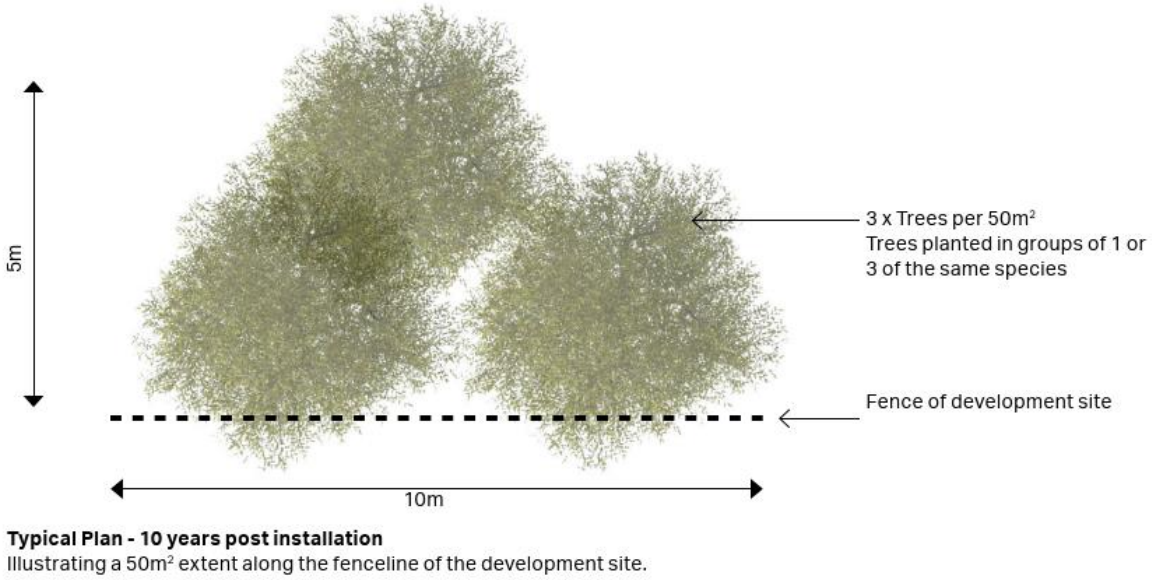

Figure 14 Typical 5m wide screening plan - 10 years post installation

4.0 Conclusion

This Early Works Strategy summarises the Glint and Glare and Landscape and Visual Impact Assessments (prepared by AECOM Australia Pty Ltd, dated 26 August 2021; 22 April 2021). Key impacts of the West Mokoan solar farm facility include:

- Glare with moderate potential for after image to several observation points and route receptors.
- Visibility of the development from local residences, commuters, tourists, and users of the adjacent Dam Wall Hiking Trail.

Mitigation measures were proposed to reduce the impact of the development which includes landscape screening zones (10m wide dense planting zones, 5m wide intermittent planting zones, and infill planting to increase density of existing vegetation). The Early Works Plan (Figure 4) identifies landscape works to occur pre-construction to accelerate screening of the development.

This involves early planting of landscape zones that interface with sensitive receptors and zones that will be required to mitigate glare post infrastructure construction.

It may also include installing site screening (shade clothes to site boundary fence) prior to construction commencement to mitigate impacts of infrastructure (in particular glint and glare) to sensitive receptors until the landscape has established to a height suitable to perform as a screen. This is one of two potential temporary mitigation measures – the alternative being to limit the resting angle of panels during backtracking.