



Manildra Solar Farm Landscape Plan



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ACRONYMS AND ABBREVIATIONS

BA	Biodiversity Assessment
BoP	Balance of Plant Contractor / Engineering, Procurement and Construction Contractor
MSFPL	Manildra Solar Farm Pty Ltd
CEMP	Construction Environmental Management Plan
DoPE	(NSW) Department of Planning and Environment
EA	Environmental Assessment
EPC	Engineering, Procurement and Construction Contractor / Balance of Plant Contractor
ER	Environmental Representative
EWMS	Environmental Work Method Statement
LP	Landscape Plan
MW	Megawatt
NSW	New South Wales
OEMP	Operation Environmental Management Plan
PV	Photovoltaic
RMS	Roads and Maritime Services
SCECO	Site Construction and Environmental Compliance Officers
SoC	Statement of Commitment
VVR	Visual Verification Report

1 INTRODUCTION

1.1 THE PROJECT

The approved Manildra Solar Farm will be constructed in the central western area of NSW, on farmland adjacent to an existing substation, approximately 2 kilometres north-east of Manildra and 30 kilometres east of Parkes. The project encompasses the construction and operation of approximately 50MWac of photovoltaic (PV) arrays over an area of approximately 180 hectares. It includes associated electrical infrastructure, maintenance facilities, access tracks and minor upgrades to adjacent roads.

1.2 LEGISLATIVE CONTEXT AND SCOPE OF THIS PLAN

The Manildra Solar Farm project was approved by the NSW Department of Planning in March 2011, under part 3A (Major Projects) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). In October 2014, a modification application was submitted to the NSW Department of Planning and Environment under Section 75W of the EP&A Act. The Modification 1 application sought to include the use of tracking panels that would have a 5 metre maximum height. This Modification was approved on 25 March 2015 by the delegate of the Minister for Planning, subject to conditions.

In July 2015, a second Modification application was submitted to the NSW Department of Planning and Environment under Section 75W of the EP&A Act. The modification 2 application sought to modify the Project's Approval, including: extending the lapse date of the approval by 3 years (i.e. to March 2019); allowing string inverters to be installed at the project; changing the noise monitoring requirements; and, updating the schedule of land for the project. The Modification 2 application was approved on 28 August 2015 by the Minister for Planning, subject to conditions.

The consolidated Conditions of Consent (August 2015) for the Project (including the Conditions from the approved Project Modifications 1 and 2), outline specific requirements for landscape management during construction and operation.

In addition, requirements have also been taken from the Submissions Report, prepared by NGH Environmental December 2010. Items that must be addressed in this plan are identified in Appendix B.

1.3 RELATIONSHIP TO OTHER ASSESSMENTS AND PLANS

1.3.1 Source documents

The following documents form source documents for the development of this plan.

- NGH Environmental 2010a. Manildra Solar Farm Environmental Assessment. Report prepared October 2010.
- Moir Landscape Architecture 2010b. Manildra Solar Farm Visual Impact Assessment. Report prepared October 2010 (included as Appendix F, within the Manildra Solar Farm Environmental Assessment)
- Moir Landscape Architecture 2012 Manildra Solar Farm Viewpoint Analysis Update, Report prepared January 2012.
- NGH Environmental 2010b. Manildra Solar Farm Submissions Report. Report prepared December 2010.

1.3.2 Associated environmental management plans

Associated environmental management plans of relevance to this plan include:

Construction Environmental Management Plan	An overarching Construction Environmental Management Plan (CEMP), currently in preparation, applies to this project. This Landscape Plan (LP) is a sub-plan of the CEMP.
Visual Verification Report	This report will verify actual post-construction views from identified receivers and advise if any changes to proposed screening measures are required.
Operation Environmental Management Plan	An overarching Operation Environmental Management Plan (OEMP), would be prepared to manage the operational stage of the project. Informed by the post-construction Visual Verification Report, the establishment and maintenance of plantings within this plan would carry over into operation. As such, this LP is also a sub-plan of the OEMP.

1.3.3 Scope of this plan

This Landscape Plan is presented in 4 parts:

Section 2	Existing environment and key impacts	Identification of landscaping objectives and standards based on visual impacts and local environmental values identified in the EA (2010a).
Section 3	Management framework	Consistent with the implementation of other construction environmental management plans and including consultation requirements to seek feedback from: <ul style="list-style-type: none"> Affected residents Interested community members Local council Roads and Maritime Services
Section 4	Key strategies for mitigation	Including selection of appropriate species to enhance, mitigate and or augment landscaping to minimise the visual impact of the project <ul style="list-style-type: none"> On the project site At residences On local roads
Section 5	Implementation plan	Setting out procedures to: <ul style="list-style-type: none"> Implement the planting following completion of construction when visual impacts are better known. Monitor plantings to ensure objectives are being met (established and maintained)

1.4 OBJECTIVES OF THE LP

The overall objective of the visual mitigation is to achieve a better visual integration of the Manildra Solar Farm and the retention of existing landscape character at both local, and regional scales (NGH Environmental 2010a). The mitigation measures attempt to lessen the visual impact of the proposed development whilst enhancing the visual character of the surrounding environment. Key performance indicators are set as follows for each specific objective of this plan.

It is noted that construction related mitigation (dust control, restoration of earthworks, colour and design of infrastructure) are covered within other plans and not within this LP.

LP Objective	Key performance outcome
Identification of landscaping objectives and standards based on visual impacts and local environmental values identified in the EA (2010a)	Compliance with strategies recommended in the EA.
Appropriate species to enhance, mitigate and or augment landscaping to minimise the visual impact of the project, on the project site, at residences, on local roads.	Reasonable stakeholder expectations are met with regard to type and location of planting. (Stakeholders in include affected residents, interested community members, local Council and Roads and Maritime Services (RMS).
Provide procedures to implement and monitor plantings to ensure objectives are being met.	All stages of implementation carried out effectively and in a timely manner. Plants are properly established and maintained.

2 EXISTING ENVIRONMENT AND KEY IMPACTS

2.1 VISUAL CONTEXT

The proposed Manildra Solar Farm is located to the north east of the Manildra township in central western New South Wales. The topography of the proposed solar farm site is defined by slightly undulating, grazing land, generally devoid of native vegetation. The majority of the Site is cleared with tree coverage occurring in sparse patches.

The broader landscape is characterised by a mosaic of agricultural land with a sparse coverage of remnant native woodland and riparian vegetation. Creek and natural drainage lines branch from the Mandagery Creek through the low points of the slightly undulating landscape.

2.2 CHARACTER OF THE PROJECT

The Photovoltaic (PV) array will be relatively low lying, reaching a height of between 3 to 5m above the existing ground level. The solar farm is designed as an array of panels arranged in a mounted horizontally in the north-south direction. Throughout the day, the arrays will track the sun, tilting 45 degrees to the east when the sun comes up and tracking through to 45 degree tilt to the west at sundown. The highest visual effect of the PV panels is likely to be seen from the east and west, where the most surface area is visible. Visibility of the solar farm from the north and south would be significantly lower.

It is noted that the project's consent conditions were modified in March 2015 to allow the option of tracking PV panels with a maximum height of 5m. Under the originally approved fixed panel project, the PV array would have been 2 - 3m above the existing ground level. The highest visual effect of the PV panels would have been likely to be seen from the north and south, where the most surface area would be visible.

2.3 KEY VISUAL IMPACTS

2.3.1 *Mitigating factors*

The solar farm site is characterised by undulating, cleared pastoral land. In general, existing landscape features of the region which assist in the reduction of the visual impact of the solar farm include:

- Riparian vegetation associated with Mandagery Creek to the east of Manildra. This provides a strong visual screen for a large percentage of developed area.
- The natural topography prevents views to the site from residential properties to the south of the site associated with Old Orange Road.
- Areas surrounding the proposed development are largely uninhabited parcels of undulating land with a sparse coverage of woodland vegetation.

2.3.2 *Predicted impacts*

The highest visual impact would be felt from those areas within the immediate vicinity of site, in particular a narrow section of Molong Manildra Road. The Molong Manildra Road is located approximately 500m to the east of the site at its closest point. Views from Molong Manildra Road are towards the western edge of the proposed development and would be seen as a grey line within the

landscape. Due to topography and existing vegetation, views to the site other than from Molong Manildra Road are restricted to areas of private land. No residences are located within these vantage areas.

Regarding other receivers, visual impacts can be summarised as shown in Table 2-1.

Table 2-1: Predicted visibility of the solar farm

Location / receiver	Visibility
Manildra town and associated residential properties.	Solar farm would not be visible.
North - A small number of homesteads are located to the north of the Site. The closest property is "Yarran" farmhouse, from which the site would be obscured by a rise in topography between the site and farmhouse.	Solar farm would not be visible.
East.	Solar farm would not be visible.
South (roads and railway).	Solar farm would not be visible.
West.	Existing plantings in this direction would buffer views of the solar farm.
Molong Manildra Road.	'Glimpse' views would occur for 500m of Molong Manildra Road, approximately 2.6km from the Manildra town centre.
Manildra Toogong Road.	Existing plantings in this direction would obscure views of the solar farm.

It is noted that this information is drawn from the assessment conducted in 2010 and that changes to existing screening vegetation may have changed. A site visit was undertaken in June 2015 and while no changes were noted, the Visual Impact Verification Report would address this issue categorically.

In the context of the area, the solar farm is expected to have a moderate visual impact. It would have a low visual impact within the context of the landscape character and scenic quality of the region. The greatest visual impact would be apparent within the immediate vicinity of the solar farm however once landscape mitigation methods have been implemented and the growth of screen planting surrounding the site has matured, the visual impact of the Solar Farm would be minimal.

3 MANAGEMENT FRAMEWORK

3.1 RESPONSIBILITIES

Responsibilities specific to the LP are detailed below in Table 3-1.

Table 3-1: Personnel with specific LP responsibilities

Name	Organisation	Role	Responsibility	Authority
TBA	MSFPL	Senior management and strategic control	Responsible for providing the required resources to facilitate the Landscape Plan	Authority to limit or stop works.
TBA	Contractor	Operational Site Manager	<p>Determining sequence and interaction of processes.</p> <p>Ensure communications and reporting framework in place.</p> <p>Ensure the goals of the CEMP and sub-plans are achieved.</p> <p>Report incidents to ER and to agencies as required.</p> <p>Ensure environmental management is appropriate and resourced.</p> <p>Review CEMP and sub-plans.</p> <p>Ensure timely delivery of corrective actions.</p> <p>Ensure requirements of the CEMP and sub-plans are communicated and implemented.</p> <p>Implement and comply with communications and reporting framework.</p> <p>Responsible for compliance with all applicable environmental legislation and contract obligations.</p> <p>Responsible for the implementation and maintenance of CEMP</p> <p>Implement and monitor corrective actions</p> <p>Comply with regulations within CEMP</p> <p>Ensure training is delivered and appropriate</p>	<p>All aspects of the environmental performance of the project during construction.</p> <p>Authority to update and implement CEMP, upon ER endorsement and agency approval, where required.</p> <p>Authority to limit or stop works.</p> <p>Authority to require environmental actions to be undertaken.</p> <p>Reports to the Proponent.</p>
TBA	TBA	Environmental Representative	<p>The principal point of advice in relation to the environmental performance of the project.</p> <p>Oversee the implementation of all environmental management plans and monitoring programs required under the planning approval, and advise the Proponent upon the achievement of these plans/programs.</p> <p>Consider and advise the Proponent on its compliance obligations against all matters specified in the conditions of the planning approval and the Statement of Commitments and all other licences and approvals related to the environmental performance and impacts of the project.</p> <p>Ensure environmental auditing is undertaken in accordance with all relevant project Environmental Management Systems.</p>	Authority to require environmental actions to be undertaken.

Name	Organisation	Role	Responsibility	Authority
			Be given the authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur.	
TBA	TBA	Site Construction and Environmental compliance officer (SCECO)	SCEOs are responsible for the day-to-day management of all on-site environmental aspects including ensuring establishment and maintenance of plantings required by the Landscape Plan. This role can be performed a construction staff member or construction manager, if they are trained and experienced in the relevant subject areas (vegetation management).	Implementation of stop work orders. Reports to EPC manager.
All site personnel		Contractors and their staff	Ensure goals of CEMP and sub-plans are implemented upon instruction. Identify and proactively report incidents. Receive training.	Suggest Stop Work orders <i>(stop work permitted if action deemed unsafe).</i>

3.2 SUBCONTRACTOR MANAGEMENT

Subcontractors are required to adapt the CEMP specific to their detailed activities. They are required to prepare activity related **Environmental Work Method Statements (EWMS)**. They may elect to prepare their own CEMP framework document but if so it must comply with the requirements stipulated in this CEMP and sub-plans.

CEMP and EWMS documentation is to be supplied to the EPC Contractor prior to works being undertaken. The EPC Contractor will be responsible for verifying whether the subcontractor documents:

1. Are consistent with the CEMP framework and sub-plans
2. Adequately address the environmental risks of the activity

Formal advice in this respect will be provided to the subcontractor before works can commence.

3.3 CONSULTATION REQUIREMENTS

Consultation requirements relevant to the LP are summarised below. Consultation will be undertaken based on the findings of the Visual Verification Report. Table 3-2 sets out the process for how this consultation will be triggered and undertaken, where required. Suggested landscaping techniques for minimising visual impact of the solar farm have also been included in this table.

Table 3-2: Consultation requirements: LP

Stage of project	Consultation requirements	Status
After construction, prior to planting	<p>Any resident identified by the VVR as affected</p> <p>Tree planting to achieve screening for homesteads with visual impacts to block parts of the development would be undertaken with each resident demonstrated to be affected, after the construction of the facility.</p>	The VVR will confirm whether this consultation is required.
After construction, prior to planting	<p>Interested community members</p> <p>Site boundary and road side planting would address impacts to the broader community.</p> <p>Where adjacent to any other planting works (Landcare or Bushcare for example), that group could be contacted and notified of the proposed plantings.</p>	The VVR will confirm whether this consultation is required.
After construction, prior to planting	<p>Local council</p> <p>Any road side plantings, where they occur on Council administered roads, would be undertaken in consultation with the Council.</p>	The VVR will confirm whether this consultation is required.
After construction, prior to planting	<p>Roads and Maritime Services (RMS)</p> <p>Any road side plantings, where they occur on RMS administered roads, would be undertaken in consultation with the RMS.</p>	The VVR will confirm whether this consultation is required.

3.4 ENVIRONMENTAL MONITORING, REPORTING AND COMPLIANCE

The CEMP and all associated sub-plans (including this Landscape Management Sub-plan) will be implemented on site during the construction period. The implementation will be monitored, reviewed and audited throughout the construction phase as described in the CEMP.

It is noted that the trigger for visual impact screen planting in accordance with this plan, will be the end of the construction period however, visual impact screen planting may be undertaken during construction phase if it does not interfere with onsite activities. To ensure compliance with this plan, the implementation phase of this plan would also be captured by the Operational Environmental Management Plan (OEMP), particularly with regard to monitoring and response to on-ground results.

4 KEY STRATEGIES FOR MITIGATION

4.1 ONSITE BOUNDARY PLANTING

Visual screen planting would be undertaken as required by the VVR in the form of boundary planting around the solar farm. This would ensure visibility is restricted from roads and nearby homesteads.

4.1.1 Location

Possible planting areas are identified in Figure 4-1, along the north, south and western boundaries. The Visual Verification report would verify the extent of planting required based on the actual impact of the infrastructure, post-construction.

4.1.2 Species

The species for use as screen planting would be endemic to the area to enhance the existing landscape character and be seen as a continuation of the existing native vegetation.

The native remnants remaining in the locality are Box-Gum Woodland remnants and derived grasslands although in many locations the groundcover is exotic.

A representative species selection is proposed for the overstorey to provide a more 'natural' visual screen as follows:

- White Box (*Eucalyptus albens*)
- Blakely's Red gum (*Eucalyptus blakelyi*)
- Yellow Box (*Eucalyptus melliodora*)

No mid or understorey planting is proposed. It is noted the understorey in many areas of the locality has been replaced by exotic species (weeds or crop species).

4.1.3 Density and planting methods

- Hardened tube stock will be planted out.
- Trees within each row and the rows themselves can be spaced 3 to 5 metres apart.

4.1.4 Establishment and monitoring requirements

Tube stock will be planted in autumn with:

- Water crystals, or regularly watered until established
- Tree guards, to provide some protection from wind and wildlife
- Stock proof tree guards, where planted in paddocks being grazed

Trees will be monitored and mortalities replaced in the first 5 years, to ensure the screen is well established.

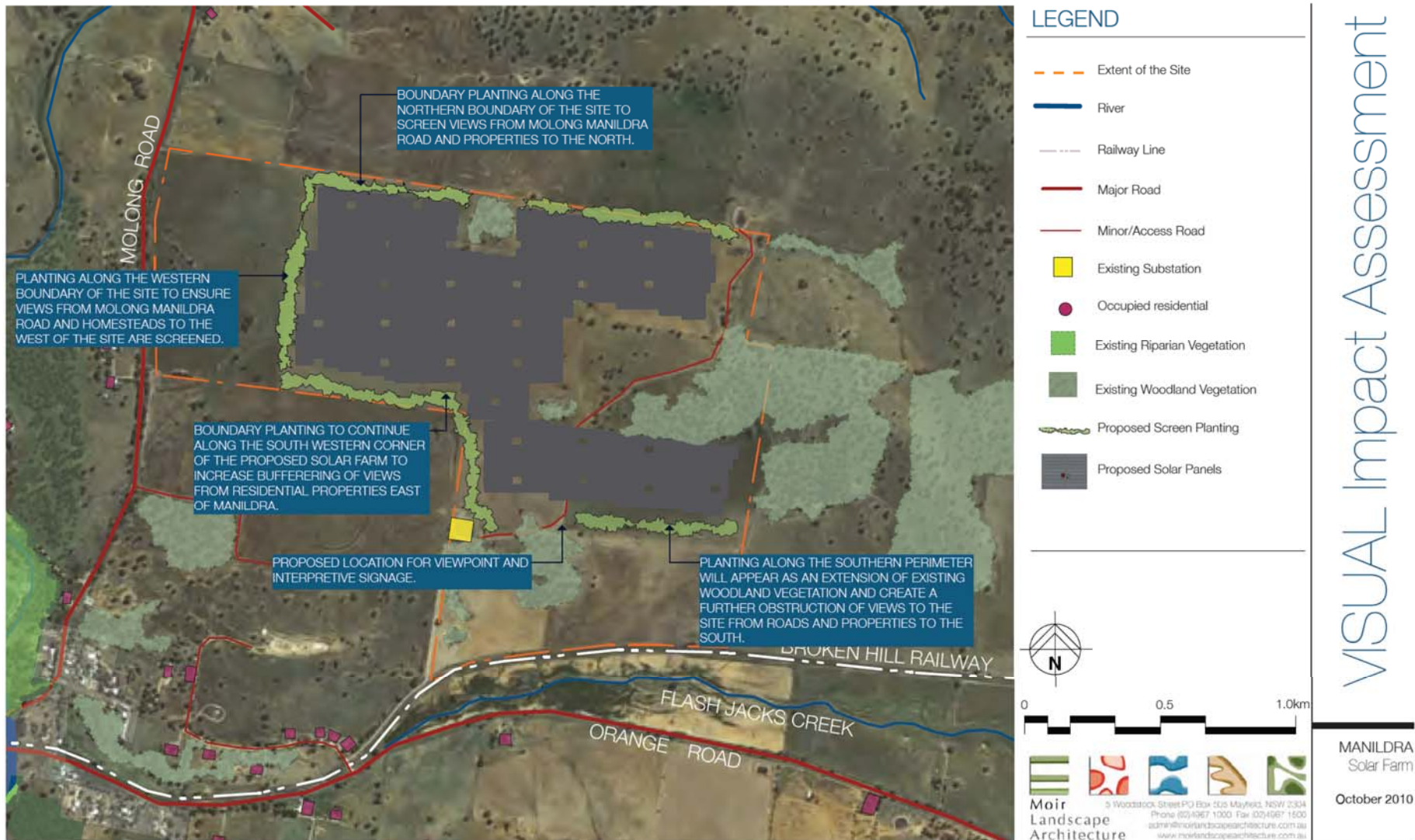


Figure 4-1 Possible onsite boundary planting (source Moir Landscape Architecture 2010b)



Figure 4-2 Section through solar farm, showing boundary planting (source Moir Landscape Architecture 2010b)

4.2 ROADSIDE PLANTING

4.2.1 Location

It is likely that the boundary planting detailed about would be sufficient to reduce views from Molong Manildra Road. However, in consultation with Council and RMS, additional planting may be undertaken within the road reserve if the boundary planting is not deemed to sufficiently address the visual impact by the Visual Verification Report.

The area identified in the Visual Impact Assessment was a 500m section of Molong Manildra Road, approximately 2.6km from the Manildra town centre.

4.2.2 Species

A representative species selection is proposed for the overstorey to provide a more 'natural' visual screen as follows:

- White Box
- Blakely's Red Gum
- Yellow Box

No mid or understorey planting is proposed.

4.2.3 Density and planting methods

- Hardened tube stock will be planted out.
- Trees within each row and the rows themselves can be spaced 3 to 5 metres apart, allowing for inter-planting with existing trees in this area.

4.2.4 Establishment and monitoring requirements

Tube stock will be planted in autumn with:

- Water crystals, or regularly watered until established
- Tree guards, to provide some protection from wind and wildlife
- Stock proof tree guards, where planted in paddocks being grazed

Trees will be monitored and mortalities replaced in the first 5 years, to ensure the screen is well established.

4.3 ON NEIGHBOURS PROPERTIES

If recommended by the Visual Verification Report, post-construction, foreground planting could be provided to homesteads within close proximity, in place of or in addition to onsite boundary planting within the solar farm, where agreed to by the affected landowners.

4.4 ADDITIONAL MITIGATION STRATEGIES

It is noted that an area on the southern edge of the site was identified as a potential location for a public viewpoint due to the expansive views over the proposed solar farm site. This feature is not currently proposed.

It is noted that construction related mitigation measures (dust control, restoration of earthworks, colour and design of infrastructure) are covered within other construction management plans and not within this LP.

5 IMPLEMENTATION PLAN

An implementation plan is provided, based on the planting strategy set out in Section 4.

Table 5-1: Planting implementation plan

Timing	Task	Implementation activity	Performance objective
Construction	Boundary planting	<p>Establish all onsite boundary planting as indicated on Figure 4-1 or as confirmed to be required, based on the Visual Verification Report (VVR). In the latter case, planting can be delayed until the results of the VVR are obtained.</p> <p>This can occur as part of construction, where the planting would not impede other site works and where the seasonal window is appropriate (autumn).</p> <p>Native vegetation is slow growing, nonetheless, the sooner that the vegetation is established, the sooner it will contribute to mitigating the impact of the solar site.</p> <p>Trees will be monitored and mortalities replaced in the first 5 years, to ensure the screen is well established.</p>	<p>Planting undertaken in appropriate seasonal window (autumn).</p> <p>Follow up watering and maintenance of tree guards undertaken until plants established.</p>
Post construction	Visual Verification Report	<p>Validate the views of infrastructure on road sides (a 500m stretch of Molong Manildra Road – 2.6km from Manildra town centre) and at nearest residences.</p>	<p>Visual impact assessment validated on ground.</p> <p>All viewpoints visited.</p> <p>Need for supplementary road side and residential planting identified or ruled out by ground validation.</p>

Timing	Task	Implementation activity	Performance objective
Post construction	Consultation	<p>If required by the Visual Verification Report, consult with:</p> <ul style="list-style-type: none"> • Council and RMS regarding proposed planting on Molong Manildra Road • Nearest residences regarding proposed supplementary boundary or residential property planting. 	<p>Supplementary road side planting presented to Council, if this need is identified by ground validation.</p> <p>Supplementary road side planting presented to affected residents, if this need is identified by ground validation.</p> <p>Feedback incorporated into plan.</p>
Post construction	Undertake planting	<p>As agreed with stakeholders, implement supplementary planting:</p> <ul style="list-style-type: none"> • on Molong Manildra Road, if required • Nearest residences, if required. 	<p>Planting undertaken in appropriate seasonal window (autumn).</p> <p>Follow up watering and maintenance of tree guards undertaken until plants established, in consultation with landowners. (Maintenance regimes and responsibilities would be determined in consultation with stakeholders and the plan updated to reflect these arrangements.</p>

6 REFERENCES

NGH Environmental 2010a. Manildra Solar Farm Environmental Assessment. Report prepared October 2010.

Moir Landscape Architecture 2010b. Manildra Solar Farm Visual Impact Assessment. Report prepared October 2010 (included as Appendix F, within the Manildra Solar Farm Environmental Assessment)

NGH Environmental 2010b. Manildra Solar Farm Submissions Report. Report prepared December 2010.

APPENDIX A CONDITION CROSS REFERENCE

Project conditions of relevance to the Landscape Plan are included detailed below. Items addressed in this plan are shaded blue.

LP Landscape Plan, this document

VVR Visual Verification Report

CEMP Construction Environmental Management Plan

ID	Full text	Timing	Addressed in:
Condition of consent			
C14	<p>c) A landscape plan for the approval of the Secretary. In preparing the plan, the proponent shall consult with council. The plan shall include but not necessarily be limited to :</p> <ul style="list-style-type: none"> i. Identification of landscaping objectives and standards based on visual impacts and local environmental values; ii. Details of species used to enhance, mitigate and or augment landscaping to minimise the visual impact of the project, particularly with respect to the impacts on nearby residences iii. Implementation, management and monitoring strategies to ensure the establishment and ongoing maintenance of landscaped areas iv. A consultation strategy to seek feedback from affected residents and the interested community on the proposed landscape measures 	Pre construction	LP
F4	<p>Within 6 months of the commissioning of the project, the proponent shall prepare and submit a visual impact verification report for the Secretary's approval...</p> <p>Within 18 months of the approval of the visual impact verification report by the Secretary, the proponent shall ensure that the measures identified in the report are implemented...</p>	Post construction	VVR
F5	<p>The proponent shall ensure that any permanent buildings are designed and constructed to minimise visual intrusion to nearest sensitive receptors as far as reasonable and feasible, including appropriate external finishes and landscape planting to screen views.</p>	Pre construction	CEMP

ID	Full text	Timing	Addressed in:
F6	The proponent shall implement a revegetation and rehabilitation program for all areas of the development footprint which are disturbed during the construction of the project, but which are not required for the ongoing operation of the project including temporary construction facility sites and sections of construction access roads, The Proponent shall ensure that all revegetation measures are implemented progressively where possible and in all cases within six months of the cessation of construction activities at the relevant area. Unless otherwise agreed to by the Secretary, the Proponent shall monitor and maintain the health of all revegetated areas until such time that the plantings have been verified by an independent and suitably qualified expert (whose appointment has been agreed to by the Secretary) as being established, in good health and self sustaining.	Construction	GCMP
Revised statements of commitment, Submissions report 2010			
30	Measures to reduce visual impacts during construction, including but not limited to the following: <ul style="list-style-type: none"> • Dust reduction throughout the construction process • Restoration of any earthworks required for the construction • Clearing of existing vegetation would be kept to a minimum 	Construction	CEMP and FFMP
31	Measures include but are not limited to the following: <ul style="list-style-type: none"> • Colour of above ground infrastructure to be sympathetic to the landscape character • Underground cabling to be utilised if practical • The design and location of ancillary works are to incorporate measures which would reduce this visual impact 	Construction Operation	CEMP OEMP
32	<ul style="list-style-type: none"> • Visual screen planting is to be undertaken in the form of boundary planting around the solar farm, foreground planting at affected viewpoints and residential tree planting. • Screening vegetation would be planted along the northern, southern and western perimeters of the site. • Roadside planting along the eastern edge of Manildra Molong Road may be undertaken to ensure views from the road are fragmented • Tree planting would be undertaken in consultation with relevant landowners to achieve screening for homesteads with visual impacts to strategically block parts of the development. • Species typical of the area would be selected to enhance the existing landscape character. 	Post construction	LP
33	A designated viewing area may be provided where visitors would be able to safely view the solar farm and surrounding landscape.	Construction Operation	CEMP OEMP