



## GUNNEDAH SOLAR FARM LANDSCAPING PLAN- V10.1



Armidale Tree Group

Distribution History

Revision	
V10	Issued for DPIE Approval
V10.1	Appendix E added

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## Contents

1	Summary.....	2
2	Background.....	2
3	Purpose.....	5
4	Objectives .....	5
5	Landscape Screening .....	5
5.1	Location and timing: (Deliverables 'a' and 'b' of Condition 10) .....	5
5.2	Species and maintenance: (Deliverable 'c' and 'd' of Condition 10).....	7
5.3	Density and Planting Methods: (Deliverable 'd' and 'e' of Condition 10) .....	7
5.4	Monitoring and Inspection.....	8
5.5	Evaluation.....	8
5.6	Post Establishment Monitoring and Management .....	9
6	General Landscaping Management & Maintenance .....	9
	Management and Maintenance Requirements.....	9
6.1	.....	9
6.2	Site description.....	9
6.3	Retention of Existing Vegetation.....	10
6.4	Ground Stabilisation.....	10
6.5	Grazing and Weed Control .....	11
7	Consultation .....	12

8	Extension of Vegetation Buffer.....	12
9	Updates to the Plan .....	12

## APPENDICES

*Appendix A General Layout of Development Plan (SSD 8658)*

*Appendix B Landscape Location Plan*

*Appendix C Consultation with Gunnedah Shire Council*

*Appendix D Landscape Management Plan*

*Appendix E Agronomist Assessment of Proposed Seed Mix*

### 1 Summary

This Landscaping Plan (LP) has been prepared for the Gunnedah Solar Farm and addresses the Conditions of Consent.

This plan was prepared based on a desktop analysis of the project addresses with the methodology and recommendations to meet conditions 10 and 11 of the DC. A site inspection will be carried out prior to implementation of the LP.

### 2 Background

Development Consent for the Gunnedah Solar Farm (SSD 8658) was granted on 12<sup>th</sup> March 2019. The following Conditions of Consent were issued in the DA with respect to the requirements of the LP.

#### **Vegetation Buffer: Schedule 3, Condition 10.**

The Applicant must establish and maintain a mature vegetation buffer (landscape screening) at the locations outlined in the figure in Appendix 1, to the satisfaction of the Secretary. This vegetation buffer must:

- (a) be planted prior to the commencement of operations;
- (b) be wholly contained in Lot 2 of the site (see Appendix 5);
- (c) consist of species that facilitate the best possible outcome in terms of screening the view of the solar panels and ancillary infrastructure on site from surrounding residences;
- (d) be effective at screening views within 3 years of the commencement of construction; and
- (e) be properly maintained with appropriate weed management.

### Landscaping Plan: Schedule 3, Condition 11.

Prior to the commencement of construction, the Applicant must prepare a detailed Landscaping Plan for the development in consultation with Council and to the satisfaction of the Secretary. This plan must include:

- (a) a description of measures that would be implemented to ensure that the vegetation buffer achieves the objectives of condition 10 (a) – (e) above;
- (b) include a program to monitor and report on the effectiveness of these measures, including if additional locations for further landscape screening are required to achieve the objectives of Condition 10 (c) and (d) above; and
- (c) include details of who would be responsible for monitoring, reviewing and implementing the plan; timeframes for completion of actions.

Following the Secretary's approval, the Applicant must implement the Landscaping Plan.

### EIS Mitigation Measures

In addition to the Conditions of the Consent the following Mitigation Measures relevant to landscaping were committed to in the Environmental Impacts Statement prepared in support of the Development Approval Application.

*Table 1 Relevant EIS Mitigation Measures*

Reference	Mitigation Measure	Comment
A7	Establish and maintain ground cover in accordance with the Land Management Plan for the site.	Addressed in Section 6.4 and Appendix D of this Plan
B1	A 10-m buffer shall be established between the perimeter of the remnant vegetation stands (V1, V2 and V3) and the works footprint.	Addressed in 6.3 of this Plan
B2	The works (e.g. plant, material stockpiling) should not encroach into remnant vegetation and buffer areas.	Addressed in 6.3 of this Plan
L1	Managed grazing will be used to maintain the height of ground cover during operation of the solar farm.	Addressed in Section 6.5 of this Plan
L2	Create and implement a remediation plan during end of operation and decommissioning.	To be submitted at this time
L3	Implement the Landscape Plan	Replaced by this plan
L4	All pesticides will be used in accordance with the <i>Pesticides Act 1999</i> , such that only registered pesticides are used based on label instructions that are designed to minimise impacts on surrounding land	Addressed in Section 5.3 and 6.5 of this Plan
S8	Undertake soil amelioration and vegetation improvement works in line with the requirements of a Land Management Plan. This should include undertaking required land	Addressed in Section 6.4 and Appendix D of this Plan

	or vegetation improvement works at an appropriate stage during solar farm development. For example, soil amelioration and fertilising might be most practically undertaken prior to solar panel installation. For similar reasons the desired pasture crop should be sown before solar panel installation.	
S12	<p>Implement a Land Management Plan that addresses the ongoing land management and maintenance activities (Refer <b>Appendix G</b>). This would address:</p> <ul style="list-style-type: none"> <li>• ongoing agronomic management of the land including stock, water, vegetation and soils management</li> <li>• measures required to maintain healthy soil and plant systems and maintain the agricultural capability of the land</li> <li>• stock management programs and infrastructure (eg fencing, watering points)</li> <li>• soil amelioration, pasture management and weed control</li> <li>• monitoring programs for soil fertility and groundcover measures to manage the site before, during and after a flood.</li> </ul>	Requirements of Land Management Plan attached at Appendix D are being implemented through this Plan as relevant.
V2	<p><i>Minimise and repair ground disturbance</i></p> <ul style="list-style-type: none"> <li>• Minimise grading across the Site and undertake the minimum levelling necessary to install panel supports</li> <li>• Rehabilitate exposed ground surfaces as soon as possible.</li> </ul>	<p>Minimise grading across the site addressed in Civil design process.</p> <p>Rehabilitation of exposed areas addressed in Section 6.4 and Appendix D of this Plan</p>
V3	Implement Concept Landscape Plan which includes visual screening prior to commencing construction works, where possible.	Replaced by this plan
V4	Retain all existing trees	Addressed in Section 6.3 of this Plan
V5	Retain as much existing ground cover (pasture grasses) beneath solar panels as possible.	Addressed in Section 6.4 and Appendix D of this Plan
V6	Progressively stabilise disturbed area with pasture grasses.	Addressed in Section 6.4 and Appendix D of this Plan

BF13	Vegetation fuel levels internal to the APZ and throughout the solar farm will be maintained by grazing, slashing or mowing	Addressed in Section 6.5
SW3	Design solar panel arrays to allow sufficient space between panels to establish and maintain ground cover beneath the panels and facilitate weed control	The Gunnedah Solar Farm is using single axis tracking solar technology which requires minimum clear space of approximately 6 metres between the rows to avoid shadowing between rows and also meeting this requirement.

### 3 Purpose

This LP is written in order to satisfy Conditions 10 and 11 as listed above. Its purpose is to make recommendations as to the implementation and maintenance of the vegetation buffer.

### 4 Objectives

The key objective of this LP is to ensure that the vegetation buffer is planned and completed as required.

To achieve this objective, a suitably experienced contractor/organisation will carry out the following:

- Ensure appropriate planning and procedures are implemented during preparation and establishment of the buffer area; and
- Manage the buffer area over time, which will include both maintenance of the buffer and evaluation of its performance against the deliverable criteria measured above.

These points are expanded on in detail in the sections below.

### 5 Landscape Screening

Planting will be as required by the Conditions of Consent in the form of vegetation buffers on the northern and eastern edge of the solar farm (see map in Appendices A & B).

#### 5.1 Location and timing: (Deliverables 'a' and 'b' of Condition 10)

The vegetation screening will be planted prior to the commencement of works where possible.

The vegetation screening will consist of six planting lines, contained in Lot 2 of the site (see Appendices A & B). Planting must occur prior to the commencement of operations. The exact number of the planting lines may be adjusted if space is a consideration.

The vegetation buffer area must be excluded from stock access, beginning at the commencement of site preparation (spraying). Stock will be continued to be excluded from the site for a minimum of five years, to allow establishment of the vegetation buffer.



## 5.2 Species and maintenance: (Deliverable 'c' and 'd' of Condition 10)

The following species recommendations were selected based on the native vegetation communities identified on page 5 of the **Land Management Plan** prepared by Pitt and Sherry and attached at Appendix D of this Plan. Critical factors for inclusion included growth characteristics, such as density and height at maturity and suitability for being planted in a flood zone. As such, some of the recommended species do not naturally occur in the two vegetation communities identified on site.

Representative species include:

Trees	Shrubs/Small Trees
<ul style="list-style-type: none"> <li>• <i>Eucalyptus camaldulensis</i></li> <li>• <i>E. melliodora</i></li> <li>• <i>E. blakelyi</i></li> <li>• <i>E. populnea</i></li> <li>• <i>E. microcarpa</i></li> <li>• <i>E. crebra</i></li> <li>• <i>E. sideroxylon</i></li> <li>• <i>Angophora floribunda</i></li> <li>• <i>Casuarina cunninghamiana</i></li> <li>• <i>Casuarina cristata</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Callistemon linearis</i></li> <li>• <i>C. viminalis</i></li> <li>• <i>C. brachyandrus</i></li> <li>• <i>C. sieberi</i></li> <li>• <i>Melaleuca bracteata</i></li> <li>• <i>Allocasuarina littoralis</i></li> <li>• <i>Acacia paradoxa</i></li> <li>• <i>Acacia cultriformis</i></li> <li>• <i>Acacia implexa</i></li> </ul>

## 5.3 Density and Planting Methods: (Deliverable 'd' and 'e' of Condition 10)

Appropriate site preparation is crucial for the long-term success of the vegetation buffer. Ideally, site preparation will begin 6-9 months prior to planting. Weeds must be controlled by spraying with Glyphosate, approximately 1.5-2m wide along each planting row. This will suitably control pasture grasses and weeds. All pesticides will be used in accordance with the *Pesticides Act 1999*, such that only registered pesticides are used based on label instructions that are designed to minimise impacts on surrounding land.

Additional weed control may be required for any woody weeds occurring in the planting area. Rows will be a minimum of 2m between centres and 1.5m from fences. Depending on local site and weather conditions, the site may need to be sprayed out twice before ripping.

Ripping will be done with a tractor, on two to three separate passes for each row, approximately 50 - 60cm deep. Ripping will only occur when the soil is dry, in order to avoid smearing, a detrimental potential outcome of ripping when the soil is too wet. After ripping, there will be a second flush of weeds, which will need to be controlled prior to planting.

Given the average temperature and rainfall patterns for Gunnedah, it is recommended that hardened hiko stock be planted out mid to late August. This will avoid the worst of the winter frosts and allow the plant roots to slightly establish before the heat of summer. All plants will be watered in at the time of planting. Follow up watering will occur approximately two weeks after planting.

Plants will be protected with a Corflute tree guard. Corflute guards are UV stabilised and have been shown to provide the optimal protection for young trees. Corflute guards create a microclimate around the immature plant, increasing the growth rate. Corflute guards will also protect from climatic extremes, browsing pests and spray drift from follow up weed control. Monitoring of the site will include assessments of both the integrity of the guards and the height of the plants. Guards will be removed before vegetative growth of the plant restricts their removal.

## 5.4 Monitoring and Inspection

Deliverables 'b' and 'c' of Condition 11.

A suitably qualified and preferably local contractor/organisation will be responsible for the management schedule. To ensure optimum survival, and in order to meet the obligations under Schedule 3, condition 10 of the consent, the site will be maintained for 3 years as detailed below. Dates provided for follow up inspections, including watering and weeding requirements, will be refined depending on seasonal conditions and recommendations based on visual inspections. All scheduled inspections will assess multiple conditions at the site, including plant and weed growth, subsurface moisture, plant losses and tree guard integrity as well as report on whether the buffer is progressing in line with expectations.

Seedlings will be monitored for 3 years with follow up watering and weed control carried out as necessary.

Trees will be monitored for mortality every 3 months during establishment with inspection. Any mortalities greater than 10%, or gaps greater than 5m will be replaced at each inspection to ensure the screening is fully established and serving its intended function.

A 12-month watering schedule must be maintained while the plants are establishing. Depending on local rainfall, this could require 6 – 12 visits. Additional watering in the second and third year may be necessary, depending on weather conditions and plant establishment.

A 12-month weed management program will include assessment of both woody weeds and pasture/grassy weeds occurring in and between the planting rows. Depending on local conditions and rainfall, weed control may be required on three separate visits post planting, roughly occurring during late spring, summer and autumn. Additional weed control in the second and third year may be necessary, depending on weather conditions and weed growth.

A monitoring report on the progress of the landscaping screen establishment shall be provided to Gunnedah Shire Council at 6 month intervals during the first 3 years. This report will detail mortality rates and replacement plantings undertaken to address any planting losses during this period.

If there are any remaining gaps in the landscape screening at the end of the 3 year establishment period, temporary screening measures will be implemented until these gaps can be addressed with additional plantings and remain in place until these plantings have reached sufficient maturity. Any temporary measures shall be determined in consultation with Gunnedah Shire Council.

## 5.5 Evaluation

The key performance criteria with respect to the buffer's screening effectiveness and proper maintenance are listed within Condition 10. Notably this is deliverable 'd' and 'e':

It is against these two key deliverables that the screen will be evaluated at each of the site inspection and maintenance visits.

1. Is growth on par as to what would be expected since planting? (describe growth and describe any issues)
2. Will the growth be effective at screening views of the solar panels? (describe)

3. Given current levels of growth, is the vegetative buffer growth expected to be effective at screening views of the solar panels within 3 years of the commencement of construction?
4. Is additional landscape screening required to meet Condition 10 'c' and 'd'?
5. What is the current condition of the site regarding weed growth? (describe and recommend actions)

## 5.6 Post Establishment Monitoring and Management

The following ongoing monitoring and management measures shall be implemented after the 3 year landscape screen establishment period.

- More than 10% of mortality in the Landscape Screen will be replanted with a selection of the same species and then managed and monitored as per Section 6.1 above.
- Every 6 months the Landscape Screen will be checked for weed levels and appropriate weed management measures implemented as required.
- During periods of drought the Landscape Screen will be inspected on a 6 monthly basis to determine if additional watering is required to ensure their survival.

# 6 General Landscaping Management & Maintenance

## 6.1 Management and Maintenance Requirements

Condition 13 of the DA includes the following deliverables for ongoing management of maintenance of landscaping across the site:

- (a) restore the ground cover of the site as soon as practicable;
- (b) maintain the ground cover with appropriate perennial species; and
- (c) manage weeds within this groundcover

## 6.2 Site description

Section 2.2.2 of the **Land Management Plan** prepared by Pitt & Sherry and provided an Appendix D for reference describes the existing site as follows:

"The Site and surrounding land is cleared agricultural land which has historically been used for grazing agriculture and is currently used for cropping agriculture. It is located on a floodplain and as such has a very flat topography. Highpoints in the area include the Kelvin Hills located 1.9km to the north of the Site and nearby water courses include the Namoi River which is located approximately 900m south of the Site with no other defined water courses in the general locality.

The vegetation and soils of the Site have been significantly disturbed by construction of roads, farming activities (landform changes), and construction of rural infrastructure including residential dwellings, sheds and silos.

The Site is largely devoid of native vegetation with only small, isolated stands of remnant vegetation.

Target weeds recorded in the vicinity include African Boxthorn (*Lycium ferocissimum*) which has already been identified on the site under current agricultural conditions and is subject to ongoing treatment to remove it from the site.

A total of 2 native vegetation communities were recorded on the Site, these being:

1. River Red Gum (*Eucalyptus camaldulensis*) – Yellow Box (*Eucalyptus melliodora*) Dry Sclerophyll Woodland/Open Woodland; and
2. Bimble Box (*Eucalyptus populnea* subsp. *bimbil*) Dry Sclerophyll Open Woodland.”

The following measures are based purely on information contained in the provided reports and will be taken as general recommendations only.

### 6.3 Retention of Existing Vegetation

The Native Vegetation Areas shown on the General Layout of Development Plan attached at Appendix A to this Plan shall be retained as part of the Development as follows:

- Protective barriers shall be erected during construction a minimum of 10 metres from the drip line of this vegetation so as to protect this vegetation or its roots systems from any access, damage or storage use during construction. These barriers shall remain in place until the completion of the construction process
- The requirement for the protection of this vegetation shall be included in site induction and toolbox training sessions where relevant.
- Any stock grazing on the site shall be prevented from entering these protected remnant native vegetation areas.
- The requirement for ongoing protection of this vegetation shall form an obligation in the ongoing Operation and Maintenance Environmental Management Plan (OEMP) for the project.

### 6.4 Ground Stabilisation

To mitigate potential erosion and sediment runoff of the site, a mix of appropriate perennial pasture grasses and legumes will be sown into areas of soil disturbance.

The recommendations provided in Section 5.2.2 of the Land Management Plan (LMP) annexed at Appendix D will be followed regarding species and establishment of pasture. Critically, the following key outcomes will be achieved:

- Disturbed areas will be progressively stabilised with pasture throughout the construction process where it is likely the areas will not be further disturbed.

- As much of the existing ground cover (pasture grasses) beneath solar panels as possible throughout the construction process.

## 6.5 Grazing and Weed Control

Grazing with sheep can be considered for keeping grass under control, alternatively, a mix of mowing and slashing with a tractor can be utilised. If sheep are to be used, it will be necessary to exclude them from landscape screen planting areas and ensure access to water points.

Fuel loads in the 10 metre Asset Protection Zones (APZs) around the perimeter of the site and 20 metre APZ around the substation will be managed using the above techniques and in accordance with Section 5.2.3 of the Land Management Plan attached at Appendix D and any further requirements set out in the Fire Management & Emergency Response to be prepared in response to Schedule 3, Condition 29 of the Development Consent.

An inspection of the site for noxious weeds will be undertaken every 6 months. Any noxious weeds detected on-site will be managed using appropriate methods.

Where this requires the application of pesticides GSF will ensure:

- an appropriately accredited (ChemCert) local contractor is engaged
  - a copy of the contractor's application treatment will be retained and filed by GSF
- this treatment record will detail the date, chemical applied and at what rates, weather conditions and the weed species sprayed.

All pesticides will be used in accordance with the *Pesticides Act 1999*, such that only registered pesticides are used based on label instructions that are designed to minimise impacts on surrounding land

Noxious weeds as identified by the Noxious Weeds Act 1993 will be notified to the relevant authority as required in accordance with the Act. If weeds are becoming an issue, advice will be sought from DPIE or local agronomists for the best strategies. Regular monitoring will be required as proposed, as weeds are more easily controlled when they first germinate.

Ongoing requirements for maintenance of the pasture across the site in accordance with the Land Management Plan at Appendix D will also be included in the Operations and Maintenance Environmental Management Plan (OEMP) for the project following the 3 year establishment period.

## 7 Consultation

This plan has been developed in consultation with Gunnedah Shire Council required by Schedule 3 Condition 10. Evidence of this consultation is attached at Appendix C for reference.

## 8 Extension of Vegetation Buffer

Schedule 3 Condition 12 of the Development Consent makes provision for a nearby residence to the development (residence VP1) to make a request for the vegetation buffer to be extended should it not be adequately minimising the visual impactors of the development as follows:

*Within 3 years of the commencement of operations, the owner of residence VP1 may request the Applicant to extend the vegetation buffer on Lot 2 of the site (see condition 10 above and Appendix 5) to minimise the visual impacts of the development on the residence.*

*Within 3 months of receiving such a request in writing from the owner, the Applicant must:*

*(a) update the approved Landscaping Plan for the development in consultation with the owner;*

*(b) ensure the updated plan:*

- *clearly identifies the extended vegetation buffer;*
- *describes the measures that would be implemented to ensure the extended vegetation buffer meets the objectives in condition 10 (b), (c) and (e);*
- *includes a program for the implementation of the extended vegetation buffer; and*

*(c) submit the updated plan to the Secretary for approval.*

*Following the Secretary's approval, the Applicant must implement the updated Landscaping Plan. Note: To identify the location of residence VP1, see the figure in Appendix 1.*

The location of residence VP1 is shown in General Layout of Development Plan which forms Appendix 1 to the Development Consent (SSD 8658) attached at Appendix A to this Plan.

## 9 Updates to the Plan

Schedule 4, Condition 2 of the Development Consent sets out the requirements for updating any strategy when before undertaking any upgrade or decommissioning works on the site as follows:

The Applicant must:

(a) update the strategies, plans or programs required under this consent to the satisfaction of the Secretary prior to carrying out any upgrading or decommissioning activities on site; and

(b) review and, if necessary, revise the strategies, plans or programs required under this consent to the satisfaction of the Secretary within 1 month of the:

- submission of an incident report under condition 4 of Schedule 4;
- submission of an audit report under condition 7 of Schedule 4; or

- any modification to the conditions of this consent.

## Appendix A – General Layout of Development Plan (SSD 8658)



## Appendix B – Landscaping Location Plan

## Appendix C – Consultation with Gunnedah Shire Council

## Appendix D Landscape Management Plan (Pitt & Sherry)

Appendix E Agronomist Assessment of Proposed Seed Mix



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**To Whom May Concern**

Dear Recipient,

As discussed with Gunnedah Land Holders in regards to the suitability of Species to introduce into area where solar farm is now setup (Seedmix). Sabi Grass and Kikuyu were selected as Spring, Summer and Autumn growing Species which would allow a Low cost easily establishing grass base into the area requiring renovation post construction. These two species would remain low Maintenance in peak growth periods and once established would be perennial in nature. Winter ground cover could be obtained by overseeding with an Annual ryegrass late Autumn, another low cost and maintenance grass option to help provide year round ground cover and broadleaf weed suppression. These mixes would allow year round trafficability around solar panels and easily slashed to manageable level infrequently (Approx. Quarterly).

These species are all well suited to the soil types and Climatic conditions of the location (Gunnedah)

Warm regards,

**Andrew Ceeney**  
**Senior Agronomist**