



Beryl Solar Farm

Landscaping Management Plan

FS NSW Project No 1 AT Pty Limited as Trustee for FS
NSW Project No 1 Asset Trust

18 January 2022

→ **The Power of Commitment**



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Contents

Abbreviations	iii
1. Introduction	1
1.1 Purpose of this report	1
1.2 Approved project	2
1.3 Landscape plan consultation	2
1.4 Disclaimer	3
1.5 Assumptions	3
2. Planting composition	4
2.1 Species criteria	4
2.2 Species selection	4
3. Planting locations	6
3.1 Screen planting locations	6
3.2 Spacing density	6
4. Preparation and planting	8
4.1 Weed control	8
4.2 Bed preparation	8
4.3 Planting	8
4.4 Fencing	9
5. Monitoring	10
5.1 Overview	10
5.2 Initial six years	10
5.2.1 Scheduled inspections	10
5.2.2 Corrective actions	10
5.3 Ongoing	10
6. Reporting	11
6.1 Internal reporting	11
6.2 External reporting	11
6.3 As-built verification	11
7. Roles and responsibilities	12
8. Timeframes	13
9. References	14
Monthly maintenance inspection checklist	17

Table index

Table 2.1	Landscape species	5
Table 3.1	Planting locations	6
Table 7.1	Roles and responsibilities	12
Table 8.1	Milestone timeframes	13

Figure index

Figure 1.1	Approved layout	2
Figure 3.1	Indicative planting configuration	7

Appendices

Appendix A	Farm layout and landscaping
Appendix B	Monthly maintenance inspection checklist
Appendix C	Geolyse 2018 Recommended Landscape Species

Abbreviations

Abbreviation	Full term
BSF	Beryl Solar Farm
DPIE	Department of Planning, Infrastructure and Environment
GHD	GHD Pty Ltd
LP	Landscaping Plan
MWRC	Mid Western Regional Council
OEH	Office of Environment and Heritage
PCT	Plant Community Type
SSD	State Significant Development

1. Introduction

1.1 Purpose of this report

This report has been prepared to support an application to modify the State Significant Development (SSD) 8183 (Modification Application) for the Beryl Solar Farm. The modification is to extend the timeframe allocated to mitigate visual impacts through establishing and maintaining a mature vegetation buffer around the site.

Geolyse Pty Ltd (Geolyse) prepared a Landscaping Plan (LP) (Geolyse 2018) to address Conditions 10 and 11 of SSD 8183:

Visual Impact Mitigation Measures

10. The Applicant must establish and maintain a mature vegetation buffer around the site at the locations outlined in Appendix 1 Note 1, to the satisfaction of the Secretary. These measures must:

- a. be planted prior to commencement of operations Note 2;*
- b. consist of vegetation species that facilitate the best possible outcome in terms of visual screening;*
- c. be effective at screening views of the solar panels and ancillary infrastructure on site from surrounding residences within 3 years of the commencement of construction Note 3; and*
- d. be properly maintained and kept free of weeds.*

Landscaping Plan

11. Prior to the commencement of construction, the Applicant must prepare a detailed Landscaping Plan for the planting within the vegetation buffer in consultation with OEH and Council, to the satisfaction of the Secretary. The plan must:

- e. include a description of measures that would be implemented to ensure that the vegetated buffer achieves the objectives of Schedule 3 condition 10 (b) – (d) of this consent:*
- f. include a program to monitor and report on the effectiveness of these measures; and*
- g. include details of who would be responsible for monitoring, reviewing and implementing the plan, and timeframes for completion of actions.*

As construction commenced in 2018, the date to achieve this requirement was 7 August 2021. While additional actions to improve the effectiveness of screening are being investigated and implemented, this condition has not yet been achieved.

The modification is requesting that condition 10c be updated to state:

*Be effective at screening views of the solar panels and ancillary infrastructure on site from surrounding residences within **6 years** of commencement of construction.*

It is anticipated that, depending on species selected, the site conditions at the time of and following planting and the more intensive monitoring and maintenance proposed in this plan, the landscape plantings may be effective in screening views of the solar farm by August 2024.

This updated LP is based on Geolyse 2018 and describes the methods required to mitigate visual impact through establishing and maintaining a vegetation buffer around the site, captures recommendations from the first two years of monitoring the landscape plantings and includes the proposed modified condition to allow an additional three years to achieve screening of views from surrounding residences.

1.2 Approved project

The Beryl Solar Farm (BSF) was granted development consent on 5 December 2017 (SSD 8183). The approved General Layout is shown in Figure 1.1. The management structure of the BSF is:

- Owner – Banpu Energy
- Operation and maintenance contractor – First Solar Australia Ltd
- Asset manager – Blueshore

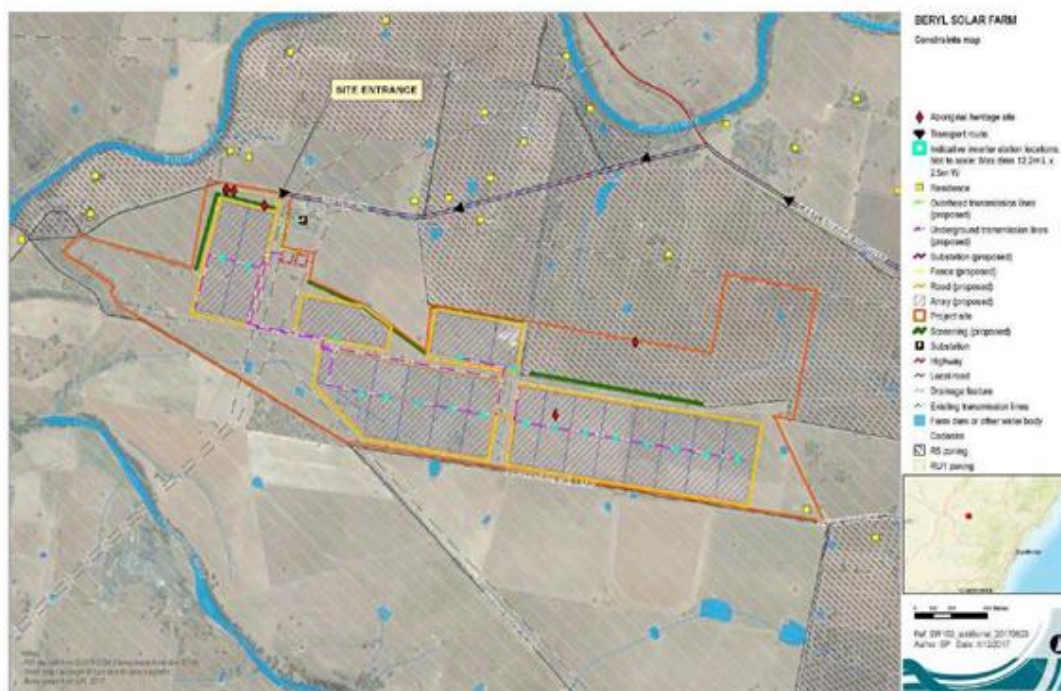


Figure 1.1 Approved layout

Source: Development Consent SSD 8183

1.3 Landscape plan consultation

SSD 8183 Condition 11 states the LP must be prepared in consultation with Department of Planning Infrastructure and the Environment (DPIE) and Mid Western Regional Council (MWRC), and to the satisfaction of the Secretary of the DPIE (or nominee).

Initial consultation was undertaken with DPIE and MWRC as part of preparation of Geolyse 2018.

Consultation undertaken as part of preparation of this updated LP has included:

- MWRC and affected landholders – undertaken by NGH environmental
- DPIE Biodiversity Conservation Division – feedback on landscape monitoring reports

1.4 Disclaimer

This report has been prepared by GHD for FS NSW Project No 1 AT Pty Limited as Trustee for FS NSW Project No 1 Asset Trust and may only be used and relied on by FS NSW Project No 1 AT Pty Limited as Trustee for FS NSW Project No 1 Asset Trust for the purpose agreed between GHD and FS NSW Project No 1 AT Pty Limited as Trustee for FS NSW Project No 1 Asset Trust as set out in section 1.1 of this report.

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The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.5 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.5 Assumptions

GHD Pty Ltd (GHD) have prepared this LP based on Geolyse 2018 to update it with:

- Details of the modification
- Proposed monitoring program
- Recommendations from GHD landscape monitoring reports
- Consultation undertaken as part of the modification

GHD have relied on information provided by Blueshore and NGH environmental in preparing the LP which has not been independently verified.

2. Planting composition

2.1 Species criteria

The composition of species to be planted to establish the vegetative buffer were determined through several criteria including requirements of the SSD 8183 and commitments (Mitigation Measures) made by the Proponent in the *Environmental Impact Statement* (ngh, April 2017) and *Submissions Report* (ngh, July 2017) assessment documentation.

Consent Condition

The vegetative buffer must:

- Consist of vegetation species that will facilitate the best possible outcome in terms of visual screening (Condition 10b)
- Be effective at screening views of the solar panels and ancillary infrastructure on site from surrounding residences within six years of the commencement of construction (Condition 10c)

Mitigation Measure

As specified in ngh environmental July 2017:

The aim of the screening is to soften the visual impact of the solar farm. A continuous, dense 'hedge' effect that blocks all views is not considered sympathetic with the existing landscape character. Native species, planted 1-2 rows deep in specific locations are intended to provide a resilient landscape treatment that would be maintained for the life of the project; all dead trees would be replaced.

Further, the *Submission Report* notes:

Where possible, landscape plantings will be comprised of local indigenous species with the objective of increasing the diversity of the existing vegetation.

2.2 Species selection

Table 2.1 provides a list of tree and shrub species that will be used to establish the vegetative screen.

These species are part of the Plant Community Type (PCT 281) Rough-Barked Apple Red Gum YellowBox woodland on alluvial clay to loam soils on valley flats in the NSW South Western Slopes and Brigalow Belt South Bioregions identified in the locality.

The species selected are relatively fast growing and thus likely to provide screening within three years. In using a selection of these species:

- Shrubs will provide screening (the *Acacia* should reach 3 meters within the next three years).
- Vegetative screening will be comprised of species representative of the communities endemic to the locality.
- Screening will comprise species that offer a diversity of growth characteristics (such as density and height at maturity) to avoid a continuous dense 'hedge' effect.

The species list has been revised from the original published in Geolyse 2018 based on a review conducted by GHD ecologists in August 2021. This review compared the species list in Geolyse 2018 with the Landcare Native Species Revegetation Guide for the MWRC area and information on the preferred growing conditions (soil types) for listed species. Species that were not listed in the revegetation guide (which GHD acknowledge is not an exhaustive list) or preferred soil conditions that were not present on site e.g. sandy/rocky soils, were removed from the list. The revised species list is presented in Table 2.1. The original species list is provided in Appendix C.

Table 2.1 Landscape species

Scientific Name	Common Name	Maximum Height (m)	Minimum Spacing (m)
Overstorey Species			
<i>Eucalyptus floribunda</i>	Rough-barked apple	30	6
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	20	6
<i>Eucalyptus melliodora</i>	Yellow Box	30	6
<i>Callitris endlicheri</i>	Black Cypress Pine	20	2-3
<i>Callitris glaucophylla</i>	White Cypress Pine	20	2-3
Midstorey Species			
<i>Acacia decora</i>	Western Silver Wattle	4	1
<i>Acacia implexa</i>	Hickory Wattle	12	2-3
<i>Acacia leiocalyx</i>	Black Wattle	6	1-2
<i>Acacia pennivervis var. pennivervis</i>	Mountain Hickory	8	2-3
<i>Bursaria spinosa subsp. spinosa</i>	Blackthorn	10	2-3
<i>Cassinia quinquefaria</i>	Wild Rosemary	3	1-2
<i>Exocarpos cupressiformis</i>	Cherry Ballart	8	2-3
<i>Geijera parviflora</i>	Wilga	10	2-3

Note: Where possible tube stock of local provenance that is genetically adapted to the local environment will be sourced. If a particular species is not available at the time of planting a close approximate species will be chosen in replacement.

3. Planting locations

3.1 Screen planting locations

SSD 8183 specified the location and extent of the landscape plantings. The location of these is identified in the Approved Layout (refer Figure 1.1). Appendix A provides the Solar Farm Layout with the location of these screenings on a scaled drawing for clear identification.

The screen plantings have been planted in four areas and collectively will provide for 3.035 km of vegetative screening.

Table 3.1 Planting locations

Screen Planting Area	Screen Planting Length (m)	Location
1	825	Inside the solar farm security fence, around the north west corner of the solar farm.
2	735	Inside the solar farm security fence, along the northern side of the solar farm
3	505	Inside the solar farm security fence, along the northern side of the solar farm
4	970	Outside the solar farm security fence, along the northern side of the solar farm at the eastern end.

3.2 Spacing density

The screening comprises two rows of plantings with variable densities designed, over time, to break up the view of the BSF infrastructure rather than hide it totally behind a 'hedge' screening. During the planning approvals process it was determined that a 'hedge' effect was not desirable in terms of landscape amenity values and that relatively sparse plantings designed to break up views of infrastructure is the desired outcome.

The rows are a minimum of 2 m between centres and 1.5 m from any fence. A mix of trees and shrubs have been spaced to accommodate for the requisite individual species spacing to permit healthy growth and avoid a planting density that would, over time, establish a hedge effect.

An indicative layout demonstrating this planting layout is provided in Figure 3.1 below.

Figure 3.1 Indicative planting configuration

4. Preparation and planting

The following section outlines methods for preparation and planting of landscape screens. All works should be undertaken by a competent vegetation management contractor with sufficient experience in similar types of works.

4.1 Weed control

Targeted weed control throughout the entire solar farm (including vegetation screens) should occur to reduce the density of weed species and reduce competition for resources for native species. Targeted chemical and manual weed control should occur within the vegetation screens prior to replanting to minimise plant death due to competition or incidental death due to being sprayed. The herbaceous exotic species should be treated using a selective spray for broadleaf weeds to avoid killing native grasses. Follow-up targeted weed control should occur at least every three months to suppress regrowth.

Weeds are to be slashed as required to reduce water and sunlight competition for the new plantings. Tree guards will be installed around all new plantings to protect saplings from herbivory and allow for ease of slashing around plantings. Jute matting (or similar) should be used within tree guards to assist with minimising growth of weeds.

4.2 Bed preparation

In areas with little to no success in the initial rounds of planting, ripping of the soil to a minimum depth of 500 mm can be undertaken. This will allow for greater root penetration and reducing the energy output required for root growth. This will increase the seedling growth rate and will enable greater access to water and nutrients. Care must be taken to not disturb the roots of successful plantings.

Following up the deep rip with mounding will concentrate the topsoil, thus increasing the nutrient and soil water holding capacity. The increase in topsoil depth will also contribute to easier establishment of seedling roots in the aerated soil.

4.3 Planting

Supplementary planting to replace the dead plants is required across BSF. New seedlings should be planted as soon as more favourable growing conditions allow, to reduce the age gap of the plants within the screen.

Plants to be planted are tubestock native species as per the list in section 2.2. Plants selected should be a size that can adapt to the changed growing conditions and will not be overly shadowed by the tree guards.

Planting should occur in spring and autumn to avoid unfavourable conditions such as high temperatures and low rainfall. If hot days occur during planting, plants that have not been planted yet must be left in the shade, to avoid heat absorption through the pot. Plants should be watered with cold water on the root zone only as wet leaves may facilitate scorching. Planting should occur during the early morning or late evening.

The planting would occur preferably before or after sustained rainfall to allow for adequate soil moisture. Manual watering would need to occur where rainfall is not sufficient to meet plant needs. Replanted trees will be watered if rainfall recorded on site measures less than the following over a three week period:

- 25 mm from one rainfall event
- 10 to 15 mm in two rainfall events

Native formulated slow-release fertiliser will be applied to each plant at the time of planting. This will provide nutrients for an average of 9 months. All plants will be watered in at the time of planting with at least 2 litres of water per plant.

Plants will be protected with UV stabilised tree guards to create a microclimate around the immature plant, increasing the growth rate. Protection during their first two seasons of growth will be critical to their long-term success rate. Guards will also protect from climatic extremes, browsing pests and potential spray drift from follow up weed control.

4.4 Fencing

Vegetation screen fencing is to be maintained to reduce plant mortality due to livestock grazing.

5. Monitoring

5.1 Overview

While the vegetative screening must be maintained for the life of the BSF, the scope and frequency of maintenance activities should diminish over time as the landscape planting fulfills its objective of effectively screening views of the solar farm. Appropriate species selection, bed preparation, planting technique and suitable early maintenance during the plantings establishment phase will reduce longer term maintenance requirements.

5.2 Initial six years

The modified development consent proposes that the landscaping be effective at screening views of the solar panels and ancillary infrastructure on site from surrounding residences within six years of the commencement of construction. To ensure optimum survival and facilitate healthy growth, the plantings will be maintained for six years as detailed below.

5.2.1 Scheduled inspections

Regular scheduled inspections will be undertaken to assess watering, plant health/mortality and weeding requirements.

The vegetation management contractor will conduct monthly inspections, reviewing the vegetative screening using the checklist provided in Appendix B. BSF's environmental consultant will review the monthly inspection findings and conduct follow up inspections where required.

The environmental consultant will conduct annual inspections of the vegetative screening including:

- Planting mortality rates
- Tree guard integrity
- Soil moisture levels
- Plant health and growth rates

Photographs will be taken at established photo points during each maintenance inspections to record growth rates and screening effectiveness.

5.2.2 Corrective actions

Following on from maintenance inspections the following corrective actions will be implemented:

- Mortalities greater than 10% or gaps greater than 5 meters will be replaced within the next three years.
- Noxious weeds will be spot sprayed or dependent on the weed and extent of infestation, chipped, pulled or slashed.
- Damaged tree guards will be replaced.
- Supplementary watering will be applied where required.

5.3 Ongoing

Following the intense maintenance undertaken during the next three years, monitoring of the vegetative screen would be undertaken annually and be restricted to weed control, mortality and replacement, and general check on vegetation health.

For the life of the BSF all screen planting mortalities would be replaced.

6. Reporting

SSD 8183 Condition 11(b) states the LP must include a program to report on the effectiveness of the landscaping measures.

6.1 Internal reporting

Each of the maintenance inspections (as detailed in Section 5) will be documented. Documentation will include observations and findings, along with recommendations for any specific maintenance tasks required, including timeframes for when these tasks need to be completed.

These records form a key component of this LP and will be held to ensure (and demonstrate) measures specified in this LP are implemented and that the landscape plantings are effective in meeting their visual mitigation objective.

6.2 External reporting

Annual evaluation reports will be prepared and submitted to DPIE throughout the next two years of monitoring. These evaluation reports will:

- Assess the health and growth of the landscape plantings.
- Assess anticipated compliance against the six year performance objective of breaking up views of the BSF infrastructure.
- Identify the need for (and detail of) any targeted strategy for rectification.

6.3 As-built verification

A Mitigation Measure that forms part of the development consent is to address the 'as-built' visual impacts of the BSF. Specifically:

A post construction audit would be undertaken to assess the effectiveness of the screening layout with reference to the final constructed infrastructure and augment the former as required.

Involvement of the most affected landowners (relevant to medium impact view locations). This may include increased onsite planting density in specific locations suggested by the landowners (for example, where the proposed solar farm would be visible from outdoor recreational areas).

Verification of predicted and actual impacts. This would improve the reliability of the measures and provide a trigger to undertake additional mitigation if required.

Pursuant to the above an 'as-built' visual impact verification will be undertaken six years after construction commencement (i.e. August 2024). This process will include consultation with the four landowners identified in the Environmental Impact Statement (ngh, 2017) as having 'medium impact view locations'.

The outcomes of this 'as-built' verification will validate the effectiveness of visual mitigation measures achieved through the implementation of this LP.

7. Roles and responsibilities

Roles and responsibilities for implementing the LP and maintaining vegetative screens to achieve screening of views of the BSF are outlined in Table 7.1.

Table 7.1 Roles and responsibilities

Organisation	Role	Responsibility
Banpu Energy	Owner	Implementing the LP as approved.
Blueshore	Asset manager	Coordinating various contractors assisting with LP implementation at BSF.
First Solar	Operation and maintenance contractor	Managing the Vegetation management contractor on site.
Armidale Tree Group	Vegetation management contractor	Conducting monthly maintenance inspections using the checklist in Appendix B. Maintaining the vegetative screens including watering, weed control, replanting, replacing tree guards.
GHD	Environmental consultant	Reviewing findings of monthly maintenance inspections. Conducting annual maintenance inspections of the BSF vegetative screens. Conducting ad hoc maintenance inspections where the monthly inspections identify issues. Reporting on findings of annual inspections.

8. Timeframes

Vegetation screening were planted prior to commencement of operations as required by SSD 8183 Schedule 3 Condition 10a. The proposed modification to SSD 8183 requires that the plantings be effective at screening views of the solar panels and ancillary infrastructure on site from surrounding residences within six years of the commencement of construction (Schedule 3 Condition 10d).

The ability to meet the six year target requires additional plantings to be undertaken as soon conditions are favourable: noting that seasonal conditions and the associated windows of opportunity for planting must be acknowledged.

The screen would be maintained for the operational life of the solar farm.

Table 8.1 Milestone timeframes

Timeframe	Commitment
August 2018	Construction start
May 2019	Original plantings
2019/20 (first year after planting)	Four scheduled inspections by environmental consultant Six (6) monthly evaluation reports submitted to DPIE
2020/21	Three scheduled inspections by environmental consultant Six (6) monthly evaluation reports submitted to DPIE
2021/22	Three scheduled inspections by environmental consultant Monthly scheduled inspections by vegetation management consultant
As soon as seasonal conditions permit in March 2022	Undertake plantings
2022/23	Annual inspection by environmental consultant Monthly scheduled inspections by vegetation management consultant Annual evaluation reports submitted to DPIE
2023/24	One annual inspection by environmental consultant Monthly scheduled inspections by vegetation management consultant Annual evaluation reports submitted to DPIE
August 2024	'As-built' verification to assess effectiveness of screening of BSF infrastructure
Ongoing for life of farm	Annual inspection by vegetation management contractor or equivalent

9. References

ISO 14001:2015(E) Environmental management systems – requirements with guidance for use

DIPNR (2004) Guidelines for the Preparation of Environmental Management Plans

Geolyse (2018) Beryl Solar Farm Landscaping Plan

Mid Western Regional Council (2014) Development Control Plan 2013

nghenvironmental (2017) Beryl Solar Farm – Submissions Report

nghenvironmental (2017) Beryl Solar Farm – Environmental Impact Statement

Appendix A

Farm layout and landscaping

Appendix B

Monthly maintenance inspection checklist

Monthly maintenance inspection checklist

Item to inspect	Requirement	Checked (Y/N)	Comment	Follow up action
Plant mortality	A count of the number of dead plants, where possible dead plants are to be identified to a species level to assist in replanting.			
Plant health	Review plant health and growth and identify any additional treatments to address poor health/growth.			
Weed infestation	Assess exotic vegetation within vegetation screens with a focus on priority weeds and/or Weeds of National Significance (WONS).			
Tree guards	Identify tree guards requiring replacement			
Watering	Evidence and effectiveness of watering schedules			
Grazing	Evidence of grazing on plantings			
Fences	Integrity of fences around vegetation screens			

Appendix C

**Geolyse 2018 Recommended Landscape
Species**



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