Benger Solar Farm Transmission Line Offset Revegetation Plan

Prepared for South Energy Pty Ltd

Cape Life Environmental Services

ABN: 63626660615

Tel: 0400185011

Email: benmiro@capelife.com.au

Web: www.capelife.com.au

Address: 57 Kevill Rd,
Margaret River, WA

Postal: PO Box 175, Margaret River, WA, 6285

Version	Prepared By	Reviewed By	Date	Comments
1.0	Ben Miro	Brook Devine	20/9/22	First Draft
2.0	Ben Miro	Brook Devine	30/9/22	Updated Revegetation Blocks
3.0	Ben Miro	Brook Devine	21/03/23	Updated Reference Site

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1. Introduction

In July 2022, Cape Life Environmental was engaged by South Energy Pty Ltd on behalf of SE Campbell Development Pty Ltd, to provide a revegetation plan associated with the development of the proposed Benger Solar Farm Transmission Line project, located in the Shire of Harvey, Western Australia. The revegetation planning and works are required by the Department of Water and Environmental Regulation (DWER) to offset the proposed clearing of 2.53 hectares of foraging habitat for the Forest Red-Tailed Black Cockatoo (*Calyptorhynchus banksii*), and 2.11 hectares of foraging habitat for the Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Baudin's Black Cockatoo (*Calyptorhynchus baudinii)* within the development footprint of the transmission line, west of the Solar Farm site, under CPS 9305/1.

This revegetation plan has been prepared in accordance with the DWER publication, *A Guide to Preparing Revegetation Plans for Clearing Permits* (GoWA, 2018b). The plan outlines the activities associated with the preparation, revegetation, monitoring, and maintenance required to revegetate 7.76 hectares of offset site in winter of 2025. The revegetation works will be implemented at three sites within South Energy's Benger Solar Farm site, in areas with remnant overstory trees that provide habitat for Black Cockatoo species. It is expected that the land will be conserved in an agreement such as a Conservation Covenant under the *Soil and Land Conservation Act 1945 (GoWA 1945).*

1.1 Objectives & Commitments

The objective of this plan is to provide details on the methodology and expectations associated with the offset revegetation and set clear targets and contingency measures for South Energy. It is expected that by offsetting this area, there will be net-environmental benefit in association with the Benger Solar Farm development. The primary condition for offsetting the proposed clearing is to reinstate Black Cockatoo habitat. This plan will include the following objectives, based on DWER requirements:

- Quantitative baseline floristic data from a reference site that provides high quality foraging habitat for local Black Cockatoo species.
- Quantitative completion criteria that will be achieved based on the baseline floristic data for the reference sites
- Methodology of revegetation installation
- Monitoring of revegetation areas and reference site
- Maintenance and contingency measures
- Schedule and budget

1.2 Background: Environmental Assessments

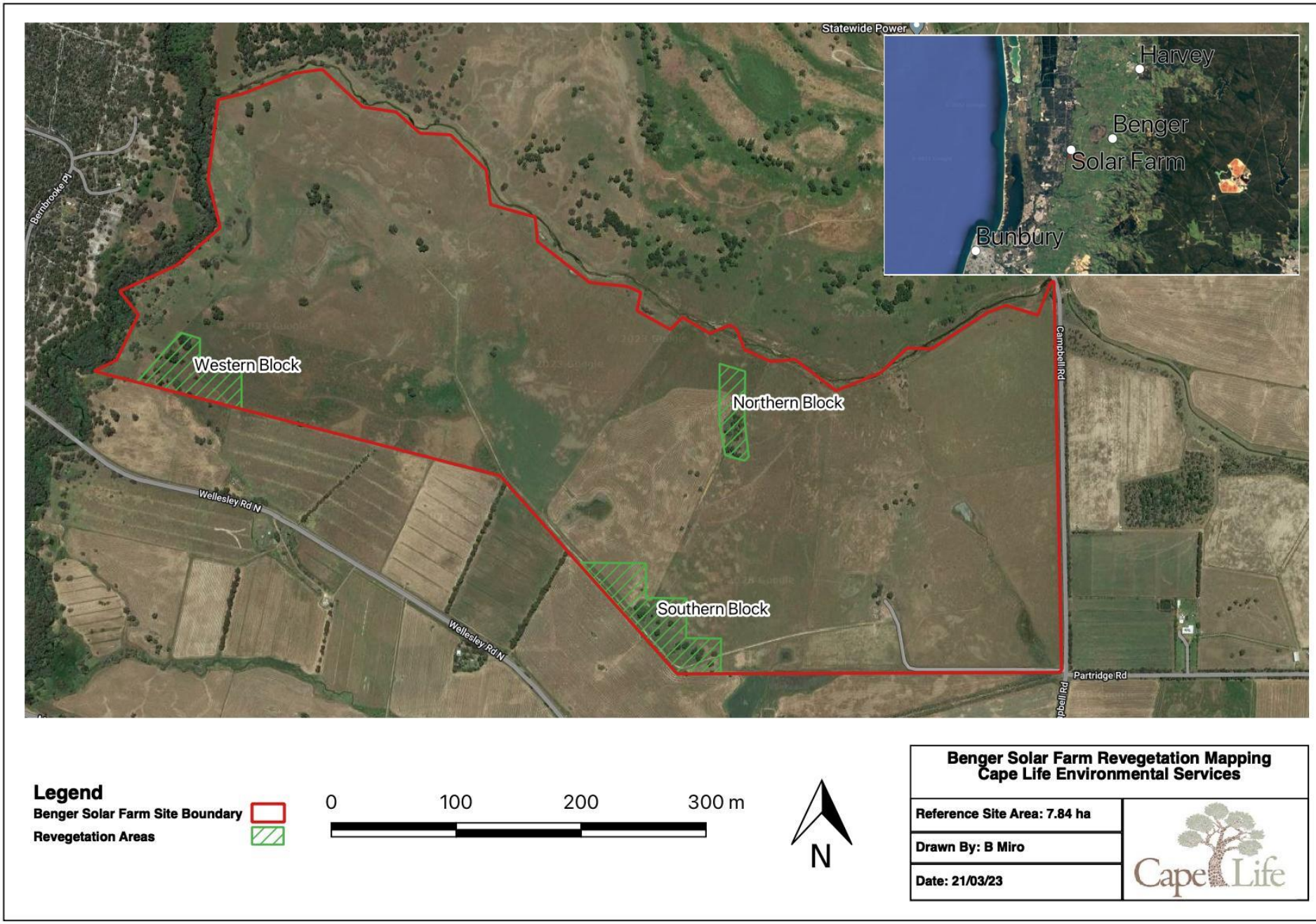
Support for the Benger Solar Farm project was given by AECOM in the document *Benger Solar Farm – Native Vegetation Clearing Permit Application* (AECOM, 2020). Environmental assessment of the proposed transmission line and reference site was undertaken by Eco Logical in the documents *Detailed and Targeted Flora and Vegetation Survey and Level 1 Fauna Survey (Spring 2019: Benger Solar Farm)* (Eco Logical 2020a), and *Kemerton Strategic industrial Area Flora and Vegetation Survey* (Eco Logical 2020b). All aformentioned documents have been used as background information within this report, which includes AECOM's Desktop vegetation, Flora and Fauna Assessment & Reconnaissance Survey, Due Diligence Report, and Black Cockatoo Assessment of the Benger Solar Farm site, the Eco Logical Targeted Vegetation Survey and Level 1 Fauna Survey of the transmission line areas proposed for clearing and the Flora and Vegetation Survey of the reference site.

2. Site Description

2.1 Site Location

The Benger Solar Farm is located within the Shire of Harvey, 5.9 km southwest of the Locality of Benger and 16.4 km southwest of the Harvey Townsite. The property is bound by the Wellesley River to the west, a tributary stream to the north, Campbell Road to the east and farmland to the south. A map of the Solar Farm boundaries and revegetation offset area is provided in Figure 1 below.

Figure 1. Benger Solar Farm Site Map



2.2 Offset Revegetation Site Description

The property is currently zoned as 'Intensive Farming' in the *District Planning Scheme No. 1*. and can be described as paddock with scattered remnant overstory trees, historically used for the grazing of cattle. The site is within the Guildford Vegetation Complex of the Swan Coastal Plain Bioregion and features typical characteristics of paddock riparian lands of the Guildford Soil landform (King & Wells, 1990). The site is topographically flat to gently undulating with sand-clay soil compositions and imperfect drainage.

The offset revegetation site proposed is 7.84 hectares within the Solar Farm site, split into three separate blocks – Western, Southern and Central Blocks. Blocks were selected based upon remnant Marri (*Corymbia calophylla*) and Flooded Gum (*Eucalyptus rudis*) trees, which have been assessed to be of "Quality" or "High Quality" in habitat and are also confirmed or potential Black Cockatoo breeding trees (AECOM 2020). All blocks are devoid of native understorey and would likely be considered "completely degraded".

Figure 2. Southern Block Site Photo

Photo is from boundary facing north east. Photo depicts typical site conditions of mature remnant *Corymbia calophylla* with paddock understory and some areas holding water (29/08/22)

2.3 Disturbances, Threats, and Other Site Conditions

Weed encroachment, herbivory, fire, and dieback will be the main threats to establishing revegetation. Management plans and actions will be included to mitigate these threats and ensure the site will be resilient in the long term.

3. Reference Site

3.1 Selection Criteria

Selection of a suitable reference site is required to record data that will assist with setting measurable revegetation targets and completion criteria for the revegetation offset site.

The areas proposed for clearing are within the Bassendeen Vegetation Complex and are classed as 'Banksia Woodlands of the Swan Coastal Plain' ecological communities in varying vegetation conditions (Eco Logical 2020a). The reference site must reflect the vegetation that is proposed to be cleared as closely as possible, as the primary objective of the offset revegetation is to compensate for the proposed clearing of habitat associated with the Red-Tailed Black Cockatoo, Baudin's Cockatoo and Carnaby's Cockatoo.

The reference site and proposed clearing area are of a different vegetation complex and ecological community to the offset revegetation sites, therefore use of the reference site will only include data that is associated with the primary objectives of Black Cockatoo habitat vegetation and foraging value. Furthermore, reference site selection and literature on pre-European ecological communities within the local Guildford Vegetation Complex is limited, as 96.7% of the Guilford Vegetation Complex within the Shire of Harvey has been cleared (GoWA 2018a) and the remaining is in a degraded condition. Due to these constraints, selection of a reference site in the Guildford Vegetation Complex is deemed inappropriate and will instead be selected from the Bassendeen Vegetation Complex.

3.2 Reference Site

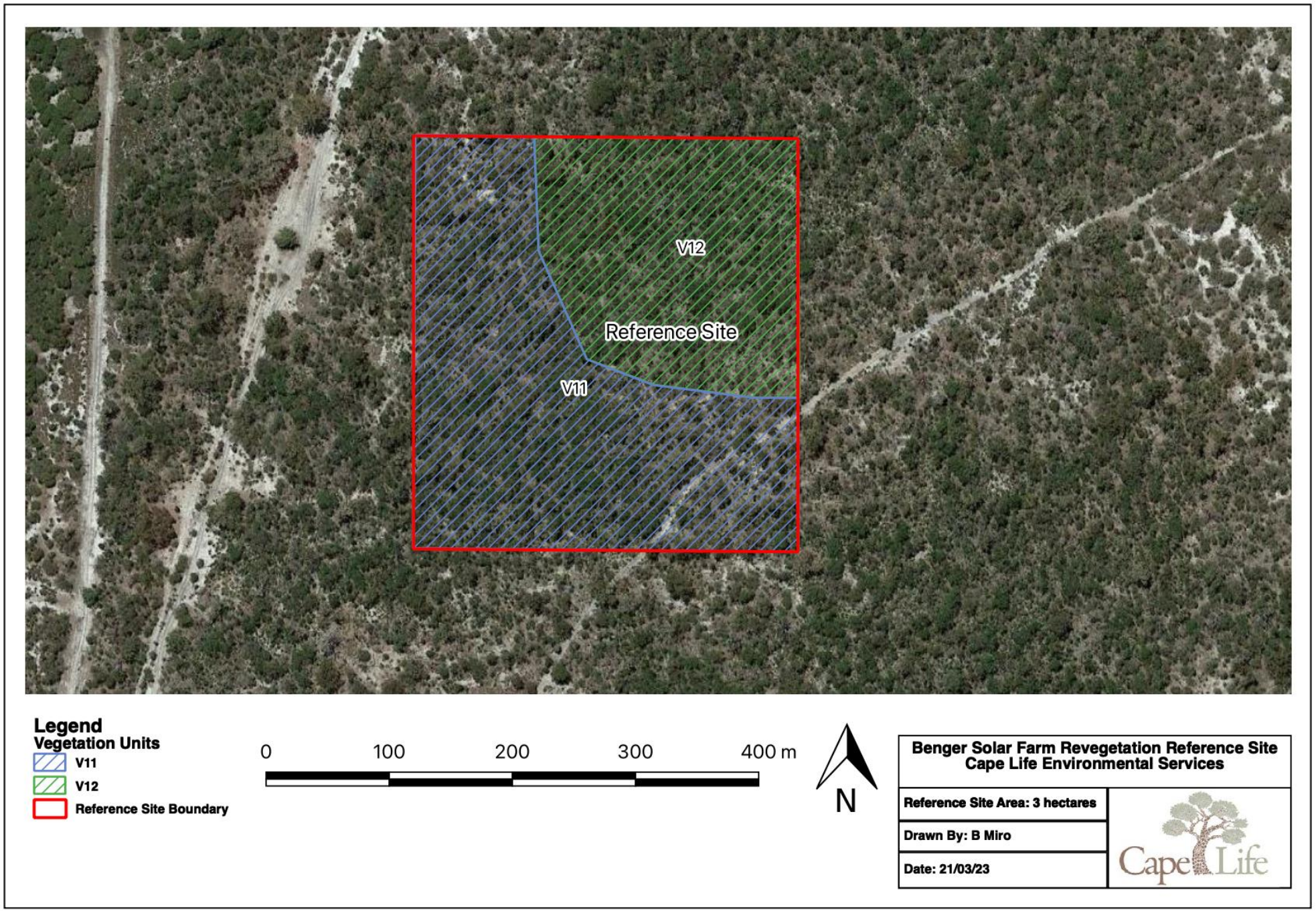
The reference site chosen will be located within Partial Lot 1 P006508 to the north of Wellington Road, Benger, which is 1600m north west of the site boundary, across the Wellesley River (See Figure 1 for broader location). The site depicted in Figure 3 below has been chosen based upon its practicable location in proximity to the Benger Solar Farm revegetation sites and transmission line clearing area to best reflect the vegetation that is to be revegetated and cleared. The land is vested to DevelopmentWA who have agreed to a 7-year access licence for the purpose of vegetation monitoring and is also currently under a farming lease. It is indicated from the mapping within the report; *Kemerton Strategic industrial Area Flora and Vegetation Survey* (Eco Logical 2020b), that the area is in "excellent" vegetation condition and has been confirmed as appropriate for use as a reference site by an on-ground survey by Cape Life. Site attributes are as follows:

Fauna habitat type VSA1 - *Very open Jarrah and occasional Marri woodland over moderately dense mid-storey of Banksia attenuata and Agonis flexuosa on sandy soil in undulating landscape*. (High-quality foraging and potential breeding for Black Cockatoos).

VT11 *Eucalyptus marginata, Corymbia calophylla tall open woodland over Banksia attenuata, Banksia ilicifolia, Agonis flexuosa mid open woodland over Kunzea glabrescens tall sparse shrubland over Melaleuca thymoides, Xanthorrhoea preissii mid sparse shrubland over Macrozamia riedlei, Hibbertia hypericoides, Bossiaea eriocarpa low sparse shrubland and Dasypogon bromeliifolius low sparse forbland.* (Likely to reprsesnt Banksia Woodlands TEC)

VT12 *Eucalyptus marginata mid open woodland over Banksia attenuata low woodland over Melaleuca thymoides, Xanthorrhoea preissii, Acacia pulchella subsp. glaberrima tall sparse shrubland over Hibbertia hypericoides, Bossiaea eriocarpa, Gompholobium tomentosum mid sparse shrubland over Dasypogon bromeliifolius, Lomandra hermaphrodita, Conostylis aculeata subsp. aculeata low sparse forbland.* (Likely to represent Banksia Woodlands TEC) (Eco Logical 2020b).

Figure 3 – Revegetation Reference Site Map



4. Revegetation Methodology

4.1 Species Selection

A list of species for the revegetation at Benger solar farm has been based upon of species found within vicinity of the local area in remnant roadsides, degraded bushland, and desktop surveys. Species selection has also included cross-referencing with the document *Plants used by Carnaby's Black Cockatoo* (Groom 2011). Species selected are proven to be successful revegetation species, suitable for supporting Black Cockatoo habitat (feeding, roosting/nesting), and suitable to the site conditions. The table in Appendix 6 details an indicative species list that will be targeted for seed collection and propagation, and it is anticipated that additional opportunistic species will be obtained adding to the species diversity and resilience of the site.

4.2 Seed Collection, Propagation of Stock

Provenance native seed will be collected from remnant vegetation close to the Benger Solar Farm site in the South West seed collection seasons between November and April in 2023/2024 and 2024/2025. Seed will be used for direct seeding or seedling propagation and will be collected, processed, and handled by licenced Revegetation Industry Association of Western Australia (RIAWA) accredited seed collectors.

Based upon the recommended rate of 4kg per hectare for direct seeding, a total of 31.04 kg of seed will be targeted for collection. Recalcitrant species will be targeted in small quantities in the first season, for nursery propagation in spring of 2024 to be ready for planting in winter 2025.

All seed collected will be vacuum sealed and placed in cool room storage at a RIAWA accredited facility until it is required for seedling propagation or direct seeding. A small amount of seed will be held back to propagate seedlings for infill planting – if required based upon revegetation monitoring in 2026.

Species identified as being difficult to secure viable seed from, or that hold significant importance regarding project objectives, will have cutting material taken from wild field populations and sent to a suitably experienced nursery. This activity will be undertaken in spring of 2024 to allow seedlings to develop in time for winter 2025 planting.

Permission from land managers such as the Shire of Harvey, Watercorp and DBCA will be obtained prior to collections from road reserves and bushland within their jurisdiction.

4.3 Site Access and Fencing

It is anticipated that access to all sites will be improved, as access from the main track running along the southern end of the site is difficult to inaccessible in a vehicle, due to ground waterlogging during winter and high rainfall months.

Fencing and lockable gates are to be installed in summer of 2023/24, to delineate the revegetation sites and create an exclusion zone from livestock and vehicle/machinery interaction whilst the revegetation site preparation is being conducted. Exclusion zones also ensure that potential pathogens such as Dieback (*Phytophthora cinnamomi)* are not introduced to the site. Entry will be limited to only essential activities or emergency workers and will be required to be clean on entry.

Fences will be Kangaroo resistant and Rabbit-proof by installing fences to a height of 1.8m, inclusive of an anti-vermin mesh skirting that is bent on the ground and projects at least 150mm inward of site (DAFWA 2015). Gates will be installed at two points in each block to facilitate revegetation works, monitoring and emergency access. Fence boundaries within the site will be kept un-obstructed to a width of 2.5m to allow for maintenance, monitoring and emergency access.

4.4 Pre-Planting Weed Control and Ground Preparation

To provide suitable ground for native vegetation establishment, existing pasture and weeds will be removed. Weed control using knock down and/or specific herbicides will be undertaken seasonally to reduce the weed seed bank prior to seeding and planting. This will be timed precisely to target growth of different pasture and weed species as they emerge at different times of the year.

Weed control will be combined with two topsoil disturbance operations using a disc-harrow after the first significant rainfall in autumn 2024 and 2025, which will encourage germination and further exhaust the weed seed-bank. The discing in 2025 will also help to alleviate soil compaction and promote root development.

Prior to direct seeding and planting in winter 2025, two weed control events will be undertaken to minimise the weed burden as seed and seedlings establish. Close to the time of the final pre-planting weed control (anticipated for late winter 2025) the site will be scarified or lightly ripped to provide niches for seed to germinate from.

4.5 Seed Pre Treatment and Batching

Pre-treating seed utilising scarification, smoking, heating, and acid soaking will be undertaken to break seed dormancy encouraging germination. Pre-treatments will occur in the days leading up to direct seeding, and the seed will be batched within 24-hours of being broadcast. Seed will be batched according to the different planting zones across the site with a mycorrhizal inoculant. Sterile sand will be mixed with the seed to enable seed to be evenly distributed across the site. Final site mapping may delineate distinct areas depending upon seasonal water-retention, which may require a varying mix of species.

4.6 Tubestock Planting and Direct Seed Broadcasting

Planting and direct seeding will occur directly after scarification, which is expected to occur in late winter of 2025 once water levels have reduced. Seedlings will be recalcitrant focused species, and planting will cover the entire site including direct seeding areas and areas where ground preparation has not been possible due to trees or rocks. Planting in direct seeding areas will aim to enhance biodiversity and provide insurance to the direct seeding, whilst planting in un-prepared areas will be the full species list to introduce understory cover or infill gaps. Seedlings will be installed at an average density of 1 seedling per 5 square meters across the site, with overstorey species to be installed at a rate of 1/20 m^2 where there is an absence of overstory, and any Sedges or Rushes planted at a higher density of 1/1 m^2.

Seedlings will be planted with Pottiputkis where ground has been disced and ripped, and with hand-held Augers to break surface compaction where ground preparation is not possible. Seed will be hand broadcasted across the site after completion of the seedling installation.

5. Monitoring, Completion Criteria & Reporting

5.1 Site Monitoring

In formal monitoring of the site will be conducted regularly to determine the timing of weed control, inspect for the presence of herbivory from mammals and insects, ensure that fencing stays in-tact and that no unexpected site issues arise.

5.2 Reference Site and Revegetation Site Monitoring

Permanent 10 m^2 x 10 m^2 quadrats will be established by stratified random placement throughout the revegetation and reference areas to be monitored in accordance with the specifications stipulated in *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (GoWA 2016). Revegetation monitoring events will be undertaken annually in spring and continue until the Completion Criteria objectives have been met. General information will be recorded such as Quadrat Number, Date, GPS Coordinates, Landform and Soil Description, and a Photograph from the north west corner of the Quadrat. Quadrat monitoring will also be substantiated by opportunistic sightings and random meander observations to further verify that the reference site has been accurately characterised and important data is identified.

It is intended that baseline monitoring occurs after revegetation plan approval, installing six 10 m2 x 10 m2 monitoring quadrats in mid-spring of 2023. The number of quadrats installed is based upon two per hectare, and placement will be decided by stratified random placement, away from tracks to minimise edge effects, avoiding ecotones and including common or dominant species (GoWA 2018b). Parameters to be assessed are as follows:

Reference Site Quadrat Monitoring (See Appendix 4):

- Species Density (Cockatoo Habitat stems, Cockatoo Foraging Stems) and Richness
- Average Health Overstorey Species
- Average Health Understorey Species
- Cover/Abundance of Non-Natives
- Vegetation Condition Rating
- Species Presence and Abundance
- Other Observations/Comments

Revegetation Site Quadrat Monitoring (See Appendix 5):

- Species Density (Cockatoo Habitat stems, Cockatoo Foraging Stems) and Richness
- Average Health Overstorey Species
- Average Health Understorey Species
- Cover/Abundance of Non-Natives
- Average Vegetation Dimensions (height/cover)
- Species Presence and Abundance
- Other Observations/Comments

5.3 Completion Criteria

The primary objective of revegetation is to establish native vegetation that will be equal or greater in habitat and foraging value for Black Cockatoo species than what is proposed for clearing. Upon completion of all criteria, the offset revegetation will fulfil the primary objective and be resilient into the future and management will shift from revegetation to conservation strategies.

For the purposes of this revegetation plan – criteria have been set based upon pre-clearing assessment documentation, *Detailed and Targeted Flora and Vegetation Survey and Level 1 Fauna Survey (Spring 2019: Benger Solar Farm)* (Eco Logical 2020a) and the *Kemerton Strategic industrial Area Flora and Vegetation Survey* (Eco Logical 2020b). Baseline floristic data will be used to quantify completion targets when baseline monitoring of the reference site occurs.

Table 1. Revegetation Completion Criteria

CLOSURE OUTCOME	COMPLETION CRITERIA	MEASUREMENT	TRIGGER	CORRECTIVE ACTION
Exclusion zone installed to secure revegetation area	Erection of a suitable perimeter fence to be installed and provide an effective barrier to prevent or reduce impacts to revegetation area	Visual inspection for fence and gate integrity undertaken seasonally Visual inspection for presence of Kangaroos and Rabbits undertaken seasonally	Fence integrity disturbed Presence or evidence of Kangaroos or Rabbits	Maintain fencing Remove Kangaroos or Rabbits
Vegetation density of species suitable for future use by Black Cockatoos	Within 5 years mean Black Cockatoo habitat stems/ha are 70% of reference site Within 5 years mean Black Cockatoo foraging stems/hectare are 70% of reference site All overstorey species have an average health score (Crown Extent and Density) of >81% All understorey species have an average health score (canopy) of >81% Vegetation shows consistent growth (height or area) annually or until maturity Within 3 years, overstorey species average a minimum of 3 m in height	Annual quadrat monitoring of density, health, coverage, and height	Mean Black Cockatoo habitat stems/ha are less than 70% of reference site, annually after 2nd year of monitoring Mean Black Cockatoo foraging stems/ha are less than 70% of reference site, annually after 2nd year of monitoring Revegetation species have an average health score less than 81 %, annually after 2nd year of monitoring Vegetation does not show consistent growth (height or area) Overstorey species are not likely to achieve 3m in height, annually after 2nd year of monitoring	Remedial planting to increase stems/ha of Black Cockatoo habitat or foraging stems to above 70% of reference site Investigation of factors affecting health or consistent growth of poor health/growth species and corrective action to remediate Addition of fertiliser to improve overstory health
Vegetation composition is similar in value to	Within 5 years mean species	Annual quadrat monitoring of species richness	Mean species richness is less than 70%, annually after	Remedial planting to increase the species

reference site in regard to Black Cockatoo habitat and foraging species richness	richness is 70% of reference site		2nd year of monitoring	richness to above 70% of reference site
Control of invasive weed impact on the site	Mean weed cover is no more than 30 % Cover 0 declared weeds	Seasonal site monitoring and annual quadrat monitoring	Seasonal site monitoring or annual quadrat monitoring detects invasive weeds likely to affect revegetation, or is > 30%, or detects any declared invasive species	Weed control of invasive weeds immediately Remedial planting where gaps in vegetation exist and are not naturally controlling weeds
Dieback	Dieback is not detected in the revegetation area	Seasonal site monitoring and annual quadrat monitoring of susceptible species Quantitative dieback assessment if suspected	Presence of dieback confirmed by visual or quantitative assessment	Revegetation with native species resistant to the pathogen Application of phosphite at recommended rates
Fire	Fire is excluded from revegetation areas to allow sufficient establishment and resilience of vegetation to fire	Seasonal site monitoring	Fire in revegetation areas	Remedial works undertaken in fire-affected areas
Reporting and revegetation management	Annual reporting is undertaken, and revegetation management plan is kept up-to-date to align with changes over time Incident reporting is undertaken	Seasonal monitoring and annual quadrat monitoring Annual reporting Incident reporting	Changes in abiotic, biotic site factors, Benger Solar Farm site management, available information, schedules, procedures, or legislation Occurrence of incidents on site	Updating revegetation plans and management as required with consultation with South Energy and DWER Incident reporting is to be undertaken and reviewed with consultation with South Energy and DWER

5.4 Reporting

All activities undertaken in association with the offset revegetation site/plan will be recorded throughout the duration of the project. An annual report will be prepared summarising activities and quadrat monitoring data will be compiled and analysed. Reporting will be suitable for submission to South Energy and DWER and will be used to direct management actions as required with consultation from South Energy and DWER. Any trigger to completion criteria observed during any site visits will be reported within 48 hours, to plan for corrective action of the occurrence promptly.

6. Maintenance & Contingency Planning

6.1 Post-Planting Weed Control

The most significant threat to the ongoing success of the revegetation project is the competition of existing and encroaching invasive weeds. Weeds will be monitored and targeted seasonally to ensure the establishing revegetation is not outcompeted by invasive species. Spot spraying using selective herbicides and manual removal will be undertaken throughout the revegetation site by licenced operators as necessary. Maintenance weed control will be most important and intensive during the first two years after revegetation. After two years, the vegetation is expected to be able to out-compete remaining weed species, and only problematic and declared weeds will be prioritised.

6.2 Post-Planting Insect Monitoring and Control

Due to the offset revegetation blocks being surrounded by pasture lands, there is a high risk of insects (Grasshoppers, Spring Beetles, Weevils, etc.) damaging new growth of establishing vegetation in the months of spring. Monitoring will occur around this time and insect control will be implemented as necessary.

6.3 Remediation Planting

Supplementary seedlings may be ordered and installed to infill gaps in vegetation or increase density/species richness as required. Remediation planting will be based upon the second year of revegetation monitoring, in 2026. Species will be chosen from the attached species list (See Appendix 6) and be selected based upon performance or any triggers to completion criteria. Small amounts of seed will be held back to facilitate any remediation planting.

Reference List

AECOM (2020), *Benger Solar Farm – Native Vegetation Clearing Permit Application* Prepared for South Energy.

Casson, N., Downes, S., Harris, A (2009) *Native Vegetation Condition Assessment and Monitoring Manual for Western Australia*. Department of Environmental Conservation, Perth, Western Australia

Department of Agriculture and Food Western Australia (DAFWA) (2015), *Rabbit fencing to protect crops and pasture.* https://agric.wa.gov.au/n/2621.

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Groom, Christine (2011), *Plants Used by Carnaby's Black Cockatoo.* Department of Environment and Conservation, Perth, Western Australia.

King, P D, and Wells, M R. (1990), *Darling Range rural land capability study*. Department of Primary Industries and Regional Development, Perth, Western Australia.

Appendix

Appendix 1. Gantt Chart Showing Schedule of Revegetation Plan Activities

Activity	Spring 23	Summer 23/24	Autumn 24	Winter 24	Spring 24	Summer 24/25	Autumn 25	Winter 25	Spring 25	Summer 25/26	Autumn 26	Winter 26	Spring 26	Summer 26/27	Autumn 27	Winter 27	Spring 27	Summer 27/28	Autumn 28	Winter 28	Spring 28	Summer 28/29	Autumn 29	Winter 29	Spring 29	Summer 29/30	Autumn 30	Winter 30	Spring 30	Summer 30/31
Seed Collection		■				■																								
Fencing Installation		■																												
Pre-Planting Weed Control			■	■	■	■	■	■																						
Ground Prep-Discing			■				■																							
Nursery Propagation					■								■																	
Ground Prep-Scarification								■																						
Planting								■																						
Direct Seeding								■																						
Supplementary Planting (if Required)																■				■										
Post-Planting Weed Control									■	■		■	■	■		■	■	■		■	■	■		■	■	■		■	■	
Insect Control (if Required)													■				■				■				■				■	
Site Monitoring			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Reference Site Quadrat Monitoring	■				■				■				■				■				■				■				■	
Quadrat Monitoring									■				■				■				■				■				■	
Reporting										■				■				■				■				■				■

Appendix 4. Reference Monitoring Data Sheet

Benger Solar Farm Reference Vegetation Monitoring Quadrat 1

Spring 2022 (To be compiled Annually)

Project Name:	**Date:**
Quadrat size: 10 m x 10 m	
GPS Coordinates:	Zone:
Easting:	Northing:
Photo Location (GPS Location):	
Landform and Soil Description:	

Species Density/Richness	
Potential Cockatoo Habitat Stems/Ha	
Potential Cockatoo Foraging Stems/Ha	
Species Richness	

Photo taken from north-west corner of quadrat

Average Health Overstorey Species		
Score	**Crown Extent and Density**	
0	None (0%)	
1	Minimal (1-10%)	
2	Sparse (11-20%)	
3	Sparse - Medium (21-40%)	
4	Medium (41-60%)	
5	Medium - Major (61-80%)	
6	Major (81-90%)	
7	Maximum (91-100%)	

Vegetation Condition Rating (EPA Tech. Guidance 2016)
Pristine/Excellent/Very Good/Good/Poor/Degraded

Average Health Understorey Species		
Score	**Description**	
0	Dead shrub	
1	<20% canopy	
2	21-40% canopy	
3	41-60% canopy	
4	61-80% canopy	
5	>81% canopy	

Cover/Abundance of Non-Natives		
Score	**Description**	
1	Rare or of low cover (<2%)	
2	Present but low numbers (2%-10%)	
3	Common locally (10%-30%)	
4	Common over whole area (30%-70%)	
5	Completely Dominating (>70%)	

Species Presence & Abundance			
Species	**#**	**Species**	**#**
Habitat			
Foraging			
Non-Native			

General Observations:

Appendix 5. Revegetation Monitoring Data Sheet

Benger Solar Farm Revegetation Monitoring Quadrat 1

Spring 2022 (To be compiled Annually)

Project Name:	**Date:**
Quadrat size: 10 m x 10 m	
GPS Coordinates:	Zone:
Easting:	Northing:
Photo Location (GPS Location):	
Landform and Soil Description:	

Species Density/Richness	
Potential Cockatoo Habitat Stems/Ha	
Potential Cockatoo Foraging Stems/Ha	
Species Richness	

Photo taken from north-west corner of quadrat

Average Health Overstorey Species		
Score	**Crown Extent and Density**	
0	None (0%)	
1	Minimal (1-10%)	
2	Sparse (11-20%)	
3	Sparse - Medium (21-40%)	
4	Medium (41-60%)	
5	Medium - Major (61-80%)	
6	Major (81-90%)	
7	Maximum (91-100%)	

Average Vegetation Dimensions	
Overstorey Height (mm)	
Understorey Height (mm)	
Cover/Abundance Native Vegetation (%)	

Average Health Understorey Species		
Score	**Description**	
0	Dead shrub	
1	<20% canopy	
2	21-40% canopy	
3	41-60% canopy	
4	61-80% canopy	
5	>81% canopy	

Species Presence & Abundance			
Species	**#**	**Species**	**#**
Habitat			
Foraging			
Non-Native			

Cover/Abundance of Non-Natives		
Score	**Description**	
1	Rare or of low cover (<2%)	
2	Present but low numbers (2%-10%)	
3	Common locally (10%-30%)	
4	Common over whole area (30%-70%)	
5	Completely Dominating (>70%)	

General Observations:

Appendix 6. Targeted Species List for Revegetation

Species	Installation Method	Cockatoo Habitat	Cockatoo Foraging
Acacia extensa	Direct Seed/Seedling		
Acacia pulchella	Direct Seed/Seedling		
Acacia saligna	Direct Seed/Seedling		Y
Agonis flexuosa	Direct Seed/Seedling		Y
Anigozanthos manglesii	Direct Seed/Seedling		
Aotus gracillima	Direct Seed/Seedling		
Astartea scoparia	Direct Seed/Seedling		
Banksia grandis	Direct Seed/Seedling		Y
Banksia littoralis	Direct Seed/Seedling		Y
Callystachys lanceolata	Direct Seed/Seedling		
Corymbia calophylla	Direct Seed/Seedling	Y	Y
Eucalyptus decipiens	Direct Seed/Seedling	Y	Y
Eucalyptus patens	Direct Seed/Seedling	Y	Y
Eucalyptus rudis	Direct Seed/Seedling	Y	Y
Gastrolobium capitatum	Direct Seed/Seedling		
Hakea ceratophylla	Seedling Only		Y
Hakea lissocarpha	Seedling Only		Y
Hakea trifurcata	Seedling Only		Y
Hakea varia	Seedling Only		Y
Hardenbergia comptoniana	Direct Seed/Seedling		
Hypocalymma angustifolium	Direct Seed/Seedling		
Jacksonia furcellata	Seedling Only		
Juncus pallidus	Direct Seed/Seedling		
Kunzea glabrescens	Direct Seed/Seedling		
Kunzea micrantha	Direct Seed/Seedling		
Lepidosperma longitudinale	Seedling Only - Root Division		
Leptocarpus scariosus	Seedling Only - Root Division		
Melaleuca lateritia	Direct Seed/Seedling		
Melaleuca preissiana	Direct Seed/Seedling		
Melaleuca rhaphiophylla	Direct Seed/Seedling		
Melaleuca teretifolia	Direct Seed/Seedling		
Melaleuca viminea	Direct Seed/Seedling		
Patersonia occidentalis	Direct Seed/Seedling		
Pultenaea reticulata	Seedling Only		
Regelia ciliata	Direct Seed/Seedling		
Taxandria linearifolia	Direct Seed/Seedling		
Vimanaria juncea	Direct Seed/Seedling		

Appendix 7. Costing and Schedule – Revegetation Implementation

Benger Solar Farm Offset Revegetation Implementation - Costing / Schedule

Item	Time	Unit	Quantity	Cost/Unit	Total Cost	Inc. GST	Comments
Reference Site Quadrat Monitoring Including setting up quadrats	Spring 2023	Hrs	16	$80.00	$1,280.00	$1,408.00	To provide baseline data, build species list completion criteria metrics for revegetation
Reference Site Reporting	Spring 2023	Hrs	8	$80.00	$640.00	$704.00	Report detailing data and analysis
Seed Collection	Summer 2023/2024	Days	28	$625.00	$17,500.00	$19,250.00	Target of 15.52kg + with at least 550g / day obtained.
Fencing Installation / Site Access	Summer 2023/2024	By South Energy					CapeLife may assist with delinating areas and access tracks to help implement site works and future maintenance
Site Visits / Informal Monitoring	Autumn 2024 - Winter 2025	Hrs	16	$70.00	$1,120.00	$1,232.00	16 hrs across the year to check site and liase with ground-prep contractors
Pre Planting Weed Control	Autumn 2024	Ha	7.76	$390.00	$3,026.40	$3,329.04	Blanket Application with Glyphosate
Ground Preparation - Discing	Autumn 2024	Ha	7.76	$520.00	$4,035.20	$4,438.72	Topsoil disturbance to encourage weed germination
Pre Planting Weed Control	Winter 2024	Ha	7.76	$390.00	$3,026.40	$3,329.04	Blanket Application with Glyphosate
Total for 2022/2023 Financial Year					**$30,628.00**	**$33,690.80**	

2.0	Reference Site Quadrat Monitoring	Spring 2024	Hrs	12	$80.00	$960.00	$1,056.00	To monitor ongoing regional effects that may influence revegetation and strengthen baseline data for reporting
2.1	Reference Site Reporting	Spring 2024	Hrs	6	$80.00	$480.00	$528.00	Report detailing data and analysis
2.2	Site Visits / Informal Monitoring	Spring 2024 - Winter 2025	Hrs	32	$70.00	$2,240.00	$2,464.00	32 hrs across the year to check site and liase with ground-prep contractors
2.3	Pre Planting Weed Control	Spring 2024	Ha	7.76	$390.00	$3,026.40	$3,329.04	Blanket Application with Glyphosate
2.4	Nursery Stock Withdrawal and Delivery	Spring 2024	Hrs	4	$70.00	$280.00	$308.00	Delivery to nearby accreddited nursery for propagation
2.5	Seed Collection	Summer 2024/2025	Days	28	$625.00	$17,500.00	$19,250.00	Target of 15.52kg + with at least 550g / day obtained.
2.6	Pre Planting Weed Control	Summer 2024/2025	Ha	7.76	$390.00	$3,026.40	$3,329.04	Blanket Application with Glyphosate
2.7	Pre Planting Weed Control	Autumn 2025	Ha	7.76	$390.00	$3,026.40	$3,329.04	Blanket Application with Glyphosate
2.8	Ground Preparation - Discing	Autumn 2025	Ha	7.76	$520.00	$4,035.20	$4,438.72	Topsoil disturbance to encourage weed germination, alleviate soil compaction
2.9	Pre Planting Weed Control	Winter 2025	Ha	7.76	$390.00	$3,026.40	$3,329.04	Blanket Application with Glyphosate

3.0	Ground Preparation -Scarification	Winter 2025	Ha	7.76	$520.00	$4,035.20	$4,438.72	provide niches for seed to settle and be protected within
3.1	Pre Planting Weed Control	Late Winter 2025	Ha	7.76	$390.00	$3,026.40	$3,329.04	Blanket Application with Glyphosate
3.2	Seedling Supply & Install	Winter 2025	Each	12900	$2.40	$30,960.00	$34,056.00	95% of site to be planted at 1/5m2 with pottiputki or handheld auger
3.3	Seedling Supply & Install - Sedges/Rushes	Winter 2025	Each	3400	$2.20	$7,480.00	$8,228.00	5% of site to be planted at 1/1m2 with pottiputki or handheld auger
3.4	Seed Withdrawals, Treatments, Batching	Winter 2025	Hrs	18	$70.00	$1,260.00	$1,386.00	Combination of treatments to trigger germination, 8 bags/ha batched with sand and mycorrhizal inoculant
3.5	Direct Seeding	Late Winter 2025	Hrs	16	$70.00	$1,120.00	$1,232.00	2 ppl for 1 day - Hand broadcast across all 3 sites
3.6	Accommodation During Planting and Seeding	Winter 2025	Each	1	$900.00	$900.00	$990.00	Allowance of 3 people for 2 nights with some staff not requiring accommodation
	Total for 2023/2024 Financial Year					**$85,482.40**	**$94,030.64**	

	Total for Implementation					**$116,110.40**	**$127,721.44**	

All items are on a pro-rata basis and only works undertaken will be billed.

Appendix 8. Costing and Schedule – Revegetation Monitoring and Maintenance

Benger Solar Farm Offset Revegetation Monitoring & Maintenance - Costing / Schedule

	Item	Time	Unit	Quantity	Cost/Unit	Total Cost	Inc. GST	Comments
1.0	Reference Site Quadrat Monitoring	Spring 2025	Hrs	12	$80.00	$960.00	$1,056.00	Monitor ongoing regional effects that may influence revegetation and provide comparison data for reporting
1.1	Revegetation Site Quadrat Monitoring Including Setting up Quadrats	Spring 2024	Hrs	20	$80.00	$1,600.00	$1,760.00	Baseline monitoring of revegetation
1.1	Annual Reporting	Summer 2025/2026	Hrs	24	$80.00	$1,920.00	$2,112.00	Provide comprehensive data and analysis of revegetation - includes communication with South Energy/DWER and re-evaluation of revegetation plan if required
1.1	Site Visits / Informal Monitoring	Spring 2025 - Winter 2026	Hrs	32	$70.00	$2,240.00	$2,464.00	32 hrs across the year to oversee site integrity, monitor vegetation condition and time weed control efficiently
1.1	Post-Planting Weed Control	Spring 2025	Ha	7.76	$552.50	$4,287.40	$4,716.14	Combination of selective herbicides and manual removal - hand/spot spraying
1.1	Post-Planting Weed Control	Summer 2025/2026	Ha	7.76	$382.50	$2,968.20	$3,265.02	Combination of selective herbicides and manual removal - hand/spot spraying
1.1	Post-Planting Weed Control	Late Autumn 2026	Ha	7.76	$552.50	$4,287.40	$4,716.14	Combination of selective herbicides and manual removal - hand/spot spraying
1.1	Post-Planting Weed Control	Winter 2026	Ha	7.76	$552.50	$4,287.40	$4,716.14	Combination of selective herbicides and manual removal - hand/spot spraying
	Total for 2024/2025 Financial Year					**$22,550.40**	**$24,805.44**	

2.0	Nursery Stock Withdrawal and Delivery (If Required)	Spring 2026						
2.1	Reference Site Quadrat Monitoring	Spring 2026	Hrs	12	$80.00	$960.00	$1,056.00	Monitor ongoing regional effects that may influence revegetation and provide comparison data for reporting
2.2	Revegetation Site Quadrat Monitoring	Spring 2026	Hrs	16	$80.00	$1,280.00	$1,408.00	Ongoing monitoring of revegetation - may indicate supplementary planting is required
2.3	Annual Reporting	Summer 2026/2027	Hrs	20	$80.00	$1,600.00	$1,760.00	Provide comprehensive data and analysis of revegetation - includes communication with South Energy/DWER and re-evaluation of management plan if required
2.4	Site Visits / Informal Monitoring	Spring 2026 - Winter 2027	Hrs	32	$70.00	$2,240.00	$2,464.00	32 hrs across the year to oversee site integrity, monitor vegetation condition and time weed control efficiently
2.5	Insect Control (If Required)	Spring 2026						High risk of insect damage on revegetation due to site location
2.6	Post-Planting Weed Control	Spring 2026	Ha	7.76	$510.00	$3,957.60	$4,353.36	Combination of selective herbicides and manual removal
2.7	Post-Planting Weed Control	Summer 2026/2027	Ha	7.76	$340.00	$2,638.40	$2,902.24	Combination of selective herbicides and manual removal
2.8	Post-Planting Weed Control	Winter 2027	Ha	7.76	$467.50	$3,627.80	$3,990.58	Combination of selective herbicides and manual removal
2.9	Supplementary Planting (If Required)	Winter 2027						
	Total for 2025/2026 Financial Year					**$16,303.80**	**$17,934.18**	

3.0	Reference Site Quadrat Monitoring	Spring 2027	Hrs	12	$80.00	$960.00	$1,056.00	Monitor ongoing regional effects that may influence revegetation and provide comparison data for reporting
3.1	Revegetation Site Quadrat Monitoring	Spring 2027	Hrs	16	$80.00	$1,280.00	$1,408.00	Ongoing monitoring of revegetation
3.2	Annual Reporting	Summer 2027/2028	Hrs	20	$80.00	$1,600.00	$1,760.00	Provide comprehensive data and analysis of revegetation - includes communication with South Energy/DWER and re-evaluation of management plan if required
3.3	Site Visits / Informal Monitoring	Spring 2027-Winter 2028	Hrs	24	$70.00	$1,680.00	$1,848.00	24 hrs across the year to oversee site integrity, monitor vegetation condition and time weed control efficiently
3.4	Post-Planting Weed Control	Spring 2027 - Winter 2028	Hrs	80	$85.00	$6,800.00	$7,480.00	Combination of selective herbicides and manual removal
3.5	Insect Control (If Required)	Spring 2026						High risk of insect damage on revegetation due to site location
3.6	Supplementary Planting (If Required)	Winter 2028						
	Total for 2026/2027 Financial Year					**$12,320.00**	**$13,552.00**	
4.0	Reference Site Quadrat Monitoring	Spring 2028	Hrs	12	$80.00	$960.00	$1,056.00	Monitor ongoing regional effects that may influence revegetation and provide comparison data for reporting
4.1	Revegetation Site Quadrat Monitoring	Spring 2028	Hrs	16	$80.00	$1,280.00	$1,408.00	Ongoing monitoring of revegetation
4.2	Annual Reporting	Summer 2028/2029	Hrs	20	$80.00	$1,600.00	$1,760.00	Provide comprehensive data and analysis of revegetation - includes communication with South Energy/DWER and re-evaluation of management plan if required
4.3	Site Visits / Informal Monitoring	Spring 2028 - Winter 2029	Hrs	16	$70.00	$1,120.00	$1,232.00	16 hrs across the year to oversee site integrity, monitor vegetation condition and time weed control efficiently
4.4	Post-Planting Weed Control	Spring 2028-Winter 2029	Hrs	60	$85.00	$5,100.00	$5,610.00	Allowance over financial year to be used as required
	Total for 2027/2028 Financial Year					**$10,060.00**	**$11,066.00**	

5.0	Reference Site Quadrat Monitoring	Spring 2029	Hrs	12	$80.00	$960.00	$1,056.00	Monitor ongoing regional effects that may influence revegetation and provide comparison data for reporting
5.1	Revegetation Site Quadrat Monitoring	Spring 2029	Hrs	16	$80.00	$1,280.00	$1,408.00	Ongoing monitoring of revegetation
5.2	Annual Reporting	Summer 2029/2030	Hrs	20	$80.00	$1,600.00	$1,760.00	Provide comprehensive data and analysis of revegetation - includes communication with South Energy/DWER and re-evaluation of management plan if required
5.3	Site Visits / Informal Monitoring	Spring 2029 - Winter 2030	Hrs	16	$70.00	$1,120.00	$1,232.00	16 hrs across the year to oversee site integrity, check vegetation condition and time weed control efficiently
5.4	Post-Planting Weed Control	Spring 2029 - Winter 2030	Hrs	40	$85.00	$3,400.00	$3,740.00	Combination of selective herbicides and manual removal
	Total for 2028/2029 Financial Year					**$8,360.00**	**$9,196.00**	
6.0	Reference Site Quadrat Monitoring	Spring 2030	Hrs	12	$80.00	$960.00	$1,056.00	Monitor ongoing regional effects that may influence revegetation and provide comparison data for reporting
6.1	Revegetation Site Quadrat Monitoring	Spring 2030	Hrs	16	$80.00	$1,280.00	$1,408.00	Ongoing monitoring of revegetation
6.2	Annual Reporting	Summer 2030/2031	Hrs	20	$80.00	$1,600.00	$1,760.00	Provide comprehensive data and analysis of revegetation - includes communication with South Energy/DWER regarding revegetation site closure
6.3	Site Monitoring	Spring 2030	Hrs	8	$70.00	$560.00	$616.00	One day in Spring year to oversee site integrity, check vegetation condition and time weed control efficiently
6.4	Post-Planting Weed Control	Spring 2030	Hrs	16	$85.00	$1,360.00	$1,496.00	Combination of selective herbicides and manual removal
	Total for 2029/2030 Financial Year					**$5,760.00**	**$6,336.00**	

	Total for Monitoring & Maintenance					**$75,354.20**	**$82,889.62**	

All items are on a pro-rata basis and only works undertaken will be billed.