Nyngan Solar Plant Biodiversity Offset Site

Annual Ecological Monitoring Report Year 7 – 2023

Final

February 28th, 2024

AGL

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Contents

Executive Summary

Background

In 2014, AGL Energy Limited (AGL) constructed the Nyngan Solar Plant (the Project), a solar photovoltaic (PV) plant with a nominal capacity of up to 106 megawatts (MW) at Nyngan in central west New South Wales (NSW). The project was approved by the then NSW Department of Planning and Infrastructure (DP&I) on 15 July 2013.

The approval included the Minister's Conditions of Approval (MCoA) of which included that an Offset Management Package be developed to offset the ecological values lost as a result of the project (McoA C5). Additionally, the biodiversity offset site is required to be monitored for a period of up to 30 years to ensure that ecological values are maintained or improved, and the results reported annually to the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) (formerly DPE). Condition C5(b) specifically states that the biodiversity outcome to be achieved must 'improve or maintain' the biodiversity values of the site.

Annual ecological monitoring has been conducted at the Nyngan Solar Plant Biodiversity Offset Site (the offset site) since January 2018. This report outlines the results of the seventh annual monitoring survey (conducted by Jacobs in January 2024). The first annual monitoring survey was conducted by Jacobs in January 2018, while the baseline study was recorded in the Biodiversity Offset Management Plan (BOMP) by NGH Environmental in 2014.

In addition, this report provides a condition assessment for the revegetation area at the Nyngan Solar Plant, which was required by the condition of approval B18 (October 2011). The revegetation area was to provide both visual screening along the southern boundary of the Solar Plant as well as future compensatory habitat for the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) in the immediate area where habitat has been removed and where the species is known to occur and breed.

Offset site condition

The Year 7 ecological monitoring has shown some further improvement and maintenance in the diversity and abundance of native plants and the overall condition of native vegetation on the offset site.

Monitoring within the offset site has occurred during both drought conditions and years of high rainfall. Ultimately, during drought years, the monitoring surveys indicated lower species diversity, cover, and condition, where, in contrast, during years of higher rainfall, these statistics showed significant improvement. Generally, when compared to the vegetation community benchmarks (DECC, 2008), it is evident that these benchmarks were met or were exceeded during years of higher rainfall. The results in this Year 7 monitoring period are now mostly within or above the benchmark condition scores for the vegetation communities and are approaching (or sometimes exceeding) baseline survey results recorded by NGH Environmental (2014). It is likely that vegetation is still recovering from the impacts of 2018 and 2019 drought conditions. The increase in average rainfall from 2020 to 2022 (including three La Niña weather events) initiated substantial recovery of vegetation, particularly in regard to native grass cover. Although after a decline in annual rainfall this year, the vegetation communities are relatively maintained from the previous year and showing improvements in some aspects, such as species richness, groundcover shrub and regeneration of overstorey species including Cypress Pine as well as a reduction in weed cover. The removal of domestic stock from the site has allowed for this recovery to continue.

The key results are summarised as follows:

- The condition of the Open White Cypress Pine Woodland community has remained stable during the last year, with overall improvements to native shrub cover and a higher species richness. Native forb species and overstorey and mid-storey have generally been maintained since the previous year. The dominant native species observed within this community include *Panicum effusum* (Hairy Panic), *Austrostipa scabra subsp. scabra* (Speargrass), *Xerochrysum viscosum* (Sticky Everlasting), *Paspalidium constrictum* (Box Grass) and *Enteropogon acicularis* (Curly Windmill Grass). Although monitoring has detected a marginal reduction in native grass cover, the community continues to be dominated by native grasses, which is part of the natural

succession of the ecosystem, and future decreases in rainfall may continue to reverse this trend. Once this pattern becomes more prevalent, it is likely that chenopod plant species may reappear in the monitoring plots, which would again increase the species richness.

- Overall, the White Cypress Pine – Poplar Box Woodland community is in moderate condition and has maintained last year's values. The community continues to exceed a number of the benchmarks and baseline values (NGH Environmental, 2014), pertaining to species richness, native grasses, native groundcover (forbs) and, in M04, overstorey cover. Grass cover was seen to decline slightly since last year, though remains substantially higher than previous years and well above the benchmark range and baseline levels. This is largely due to the recent abundance of native *Paspalidium constrictum* (Box Grass) and *Panicum effusum* (Hairy Panic) grass, likely responding to consecutive years of higher rainfall. Groundcover shrub has slightly decreased in M03, as a result of competition with native grasses, where M04 has displayed an increase, both plots continuing to remain within the benchmark range for the community. Recruitment of Eucalypt species remains low in these areas and may require more years of favourable weather conditions to allow for higher seed dispersal and germination.
- Stock proof fencing around the offset site was installed in early 2018 and is in good condition (following some repairs in 2021). The fence is in good condition around the perimeter of the offset site although two wild pigs were observed within the offset site. Ongoing inspections and management actions need to be taken to prevent domestic stock and pest herbivore species from accessing the site in the future.
- Fauna habitats across the site are diverse and include fallen logs, standing dead trees (stags), hollow bearing trees and grass/forb groundcover. These habitats have generally been maintained in similar condition.
- Grey-crowned Babblers (Vulnerable under *NSW Biodiversity Conservation Act 2016*) were observed calling within the offset site along the western woodland area on January 18, 2024.
- Overall weed infestation across the offset site was low and targeted herbicide treatment in 2021 and 2022 appears to have been effective (particularly against Saffron Thistle). Weed coverage has decreased by approximately 6% this year, likely due to weed management and a reduction in annual rainfall. None of the weeds identified within the site are declared as state or regional priority weeds under the *Biosecurity Act 2015* or the *Western Regional Strategic Weed Management Plan 2023-2027* (LLS, 2022). Weeds can be maintained by spot treatment (or other methods), as outlined in the management actions (**Table 5-1**).

The management actions outlined in this report will further assist the natural regeneration of the site over the next twelve months.

The Nyngan Solar Plant revegetation area condition

The estimated survival rate of the planted tubestock has remained similar to last year, with some regeneration occurring, and many of these plants that survived the 2018/2019 drought conditions have shown considerable growth.

This year, the total overall native vegetation cover for the revegetation area is slightly lower than the previous year, though with a marginal growth in native groundcover-other (forbs). Native grass cover continues to dominate the groundcover, resulting in above benchmark values, though recorded a small decline since the previous year. Likely due to less competition with native grasses, native forb species have increased in cover, resulting in a higher species richness since the previous year. Additionally, two new native grass species were recorded this year within the revegetation area including *Eragrostis sp.* and *Sporobolus caroli*.

Weed infestation within the revegetation area was low to moderate and targeted herbicide treatment in September 2023 appears to have been effective.

Fencing around the site is in good condition and will assist in excluding any livestock and some feral pests and as such further support the natural regeneration process. One Red Fox was observed within the revegetation area, therefore, in line with the management measures outlined in the BOMP (NGH Environmental, 2014), baiting or trapping is required.

Five Grey-crowned Babbler birds (listed as Vulnerable under *NSW Biodiversity Conservation Act* 2016) were reportedly observed in the middle of the western revegetation area on the 29/09/2022 (during an inspection by a contractor). However, none were observed within the revegetation area during the surveys for this monitoring report (January 2024). The revegetation area currently provides marginal quality habitat for this target species. As the planted shrub species and overstorey Eucalypts grow, habitat values may improve, however it is likely to take 5 to 10 years before the planted trees reach suitable height and density. Gaps between tree patches will also require replanting to maintain linear corridors.

1. Introduction

1.1 Background and study area

In 2014, AGL Energy Limited (AGL) constructed a solar photovoltaic (PV) plant (the Nyngan Solar Plant) with a nominal capacity of up to 106 megawatts (MW) at Nyngan in Central West New South Wales (NSW). The Nyngan Solar Plant is located approximately 10 kilometres (km) to the west of the Nyngan township. The site is approximately 300 hectares (ha) in area with additional areas of land for linear easements for the connection of the project's electrical infrastructure to the Nyngan – Cobar 132 kilovolt (kV) transmission line. The location of the solar plant, access and transmission easements and offset site are shown in **Figure 1-1**.

The Nyngan Solar Plant was approved by the then Department of Planning and Infrastructure (DP&I) on the 15 July 2013. The Minister's Condition of Approval (McoA) prescribed that an Offset Management Package be developed to offset the ecological values lost as a result of the Nyngan Solar Plant (McoA C5, detailed in **Appendix B**).

In addition to this condition of consent, the proponent also committed to the following mitigation measures relating to offsets within the Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013):

An Offset Plan would be developed with input from OEH and the CMA and according to the strategy provided in Appendix G of the Biodiversity Assessment (which included a proposed 1:5 offset ratio). It would be finalised prior to any construction impacts, as outlined in the Biodiversity Assessment. The objective of offsetting is to ensure that an overall 'maintain or improve' outcome is met for the project; where impacts cannot be avoided, or sufficiently minimised, the residual impact would be offset in perpetuity.

Prior to finalising the offset site boundaries, the proponent would validate the area impacted by construction to ensure that the actual, not estimated, impacted area is offset.

The offset site management actions and their outcomes are be reported annually to the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) (formerly DPE) for the duration of the project (up to 30 years) to demonstrate that a 'maintain or improve' outcome has been met. This monitoring period may vary, depending on the outcomes recorded across the site at each monitoring event, at the discretion of NSW DCCEEW.

AGL secured an offset site approximately 10 km southwest of the Nyngan Solar Plant site. The offset site is in the north-western corner of Lot 30 in Deposited Plan 752879 and is approximately 50 ha in area (see **Figure 1-1**). As an additional compensatory measure, AGL also created a five-hectare revegetation area within the Nyngan Solar Plant site to further mitigate the loss of habitat for the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) (listed as Vulnerable under *NSW Biodiversity Conservation Act* 2016).

AGL are responsible for ongoing monitoring and management at the offset site and revegetation area.

1.2 Monitoring objectives

This report documents the results of the seventh annual ecological monitoring event for the offset site, as required under Condition of Approval (CoA) C5. The objective of the annual monitoring is to demonstrate an 'improve or maintain' outcome for the identified biodiversity offset values at the offset site and to identify any management or remedial actions required to achieve these outcomes as informed by the annual monitoring program.

Monitoring requires the collection of ecological data, consistent with the methodology described in the Biodiversity Offset Management Plan (BOMP) prepared by NGH Environmental (2014). The results are described and analysed with comparison to benchmark data, the baseline data from the BOMP (NGH Environmental, 2014), and those of the temporal monitoring in years 2018-2023 (Jacobs) to determine if there have been any

significant changes in the vegetation and habitat conditions that are not consistent with improving or maintaining the biodiversity values of the offset site.

In addition, an evaluation was undertaken of any required management actions and their effectiveness, as outlined in the BOMP (NGH Environmental, 2014). The BioBanking Assessment Methodology (BBAM) (DECC, 2009) also lists the standard management actions required to be undertaken at offset sites. This includes management of grazing for conservation, weed control, management of fire for conservation, management of human disturbance, retention of regrowth and remnant native vegetation, replanting or supplementary planting where natural regeneration will not be sufficient, retention of dead timber, erosion control and retention of rocks.

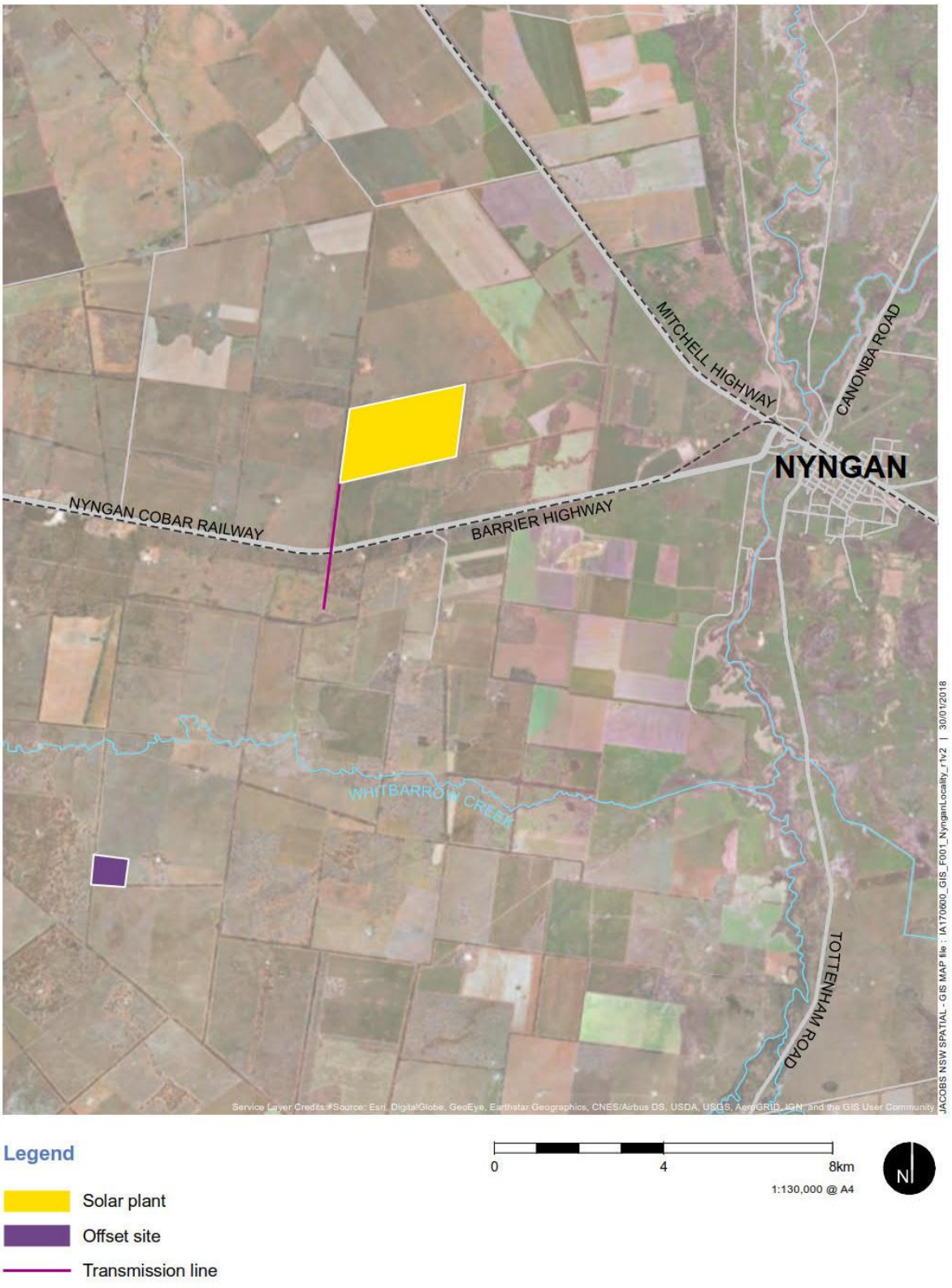

Figure 1-1. Nyngan Solar Plant and offset site location

2. Monitoring method

2.1 Requirements

The monitoring method is consistent with the methodologies outlined in the BOMP (NGH Environmental, 2014) and meets the requirements of the CoA C5, outlined in **Appendix B**. CoA C5(b) stipulates the requirement of the offset site to achieve an 'improved or maintained' outcome for the biodiversity values of the site. Improved or maintained outcomes for the biodiversity values of the offset site have been evaluated through the comparison of ecological monitoring data against the benchmark and initial baseline data for each surveyed vegetation community as well as the evaluation of weed infestation and fauna habitat. An overview of the monitoring method used for the offset site include:

- **Vegetation condition assessment:** Following the methodology used in the BOMP (NGH Environmental, 2014), assessment was undertaken using the BioBanking Assessment Methodology (BBAM) (DECC, 2009) to collect data on vegetation structure, cover and quality across transects and within plots. This data was then compared with the NGH Environmental (2014) baseline data and the benchmark data for each vegetation community type using the OEH Vegetation Benchmarks Database (DECC, 2008). The BBAM has now been replaced with the Biodiversity Assessment Methodology 2020 (BAM) which no longer uses the Modified Braun Blanquet method to assess floristic cover and abundance. Given that this study originally used the BBAM (with Modified Braun Blanquet cover/abundance data), this method has been continued in order to enable comparison of vegetation condition between previous years, including the baseline assessment. The current vegetation condition assessment monitors changes in 2023 and was completed in mid January 2024 (Year 7) the condition is compared with:
    - Benchmark data
    - Baseline study (included in the BOMP, NGH Environmental, 2014)
    - Monitoring data (Jacobs 2017 – 2022).
- **Habitat evaluation**: Notes on fauna habitat were taken across the broader offset site while traversing the site to reach the monitoring plots. At each monitoring plot, detailed notes were also taken to report on habitat condition.
- **Fencing evaluation**: Fences were assessed through observation by driving and walking around the perimeter of the offset site, to assess general condition and identify any areas requiring maintenance.

The methodology for monitoring the revegetation area of the Nyngan Solar Plant is described in **Section 2.2.5** and **Section 4**.

2.2 Field survey

The field survey was undertaken by two Jacobs ecologists, Emma Weatherstone and Kirsty Raines on January 18, 2024, across the two vegetation types identified within the offset site (listed in **Table 2-1** and shown on **Figure 2-2**), and January 16, 2024, within the Nyngan Solar Plant Revegetation Area. Monitoring was conducted in January 2024 to capture change in condition over 2023 from previous sampling in December 2022.

The predominant vegetation within the offset site was described by NGH Environmental (2014) as Poplar Box – Gum-barked Coolabah-White Cypress Pine shrubby woodland (Veg ID 103) (Benson *et al.,* 2006). NGH Environmental (2014) also notes some characteristics of White Cypress Pine – Polar Box woodland on footslopes and peneplains (ID 72), particularly regarding the dominance of White Cypress Pine (*Callitris glaucophylla*) and the presence of groundcover species. The Biometric benchmarks for these vegetation types are the same (DECC, 2008). Difference in structure and species composition occur across the offset site, most likely due to past disturbance and land management, which have resulted in two main forms of the community being present (NGH Environmental, 2014):

1) Open White Cypress Pine Woodland
2) White Cypress Pine Polar Box Woodland.

Table 2-1 shows the area occupied by these vegetation types within the offset site and the monitoring plots sampled in each.

In addition, NGH Environmental (2014) describes a small area (0.66 ha) of vegetation dominated by Budda (*Eremophila mitchellii*), see **Figure 2-2**. The dominance of Budda in this area is considered most likely due to the removal of overstorey and mid-storey species by past landholders, thus eliminating competition, or other past disturbance such as a localised fire (NGH Environmental, 2014). This area was described qualitatively and mapped by NGH Environmental (2014) but not surveyed in detail by NGH Environmental. This area is considered part of the Open White Cypress Pine Woodland. It does not constitute a different vegetation type and does not contain any annual monitoring sites.

Table 2-1. Vegetation types monitored within the offset site

Vegetation Type (DECC, 2008)	PCT ID	Area in offset site (ha)	Monitoring plots sampled by NGH Env. (2014)	Monitoring plots sampled by Jacobs (2017-2024)
Open White Cypress Pine Woodland	70	41.5	M01 & M02 (2 plots)	M01 & M02 (2 plots)
White Cypress Pine – Poplar Box Woodland	72	8.5	M03 & M04 (2 plots)	M03 & M04 (2 plots)

2.2.1 Vegetation condition assessment and establishment of monitoring plots

Monitoring plots were sampled using the BioBanking Assessment Methodology (BBAM) (DECC, 2009), as outlined in COA C5 (**Appendix B**) and in the BOMP (NGH Environmental, 2014). Baseline surveys undertaken by NGH Environmental (2014) set up two monitoring plots per vegetation community. Jacobs (2022) have replicated their approach (see **Table 2-1**).

Floristic data was collected to enable comparison between baseline data and benchmarks recorded in the BOMP (NGH Environmental, 2014). The four monitoring plots established by NGH Environmental (2014), were located at the site using recorded GPS coordinates. These plots were previously marked in the field using star pickets driven into the ground to facilitate future replication. Pickets were placed at the start and end of a 50 metre transect and their coordinates recorded. Start points were delineated with white spray paint sprayed on the top of the picket. A 20 x 20 metres quadrat required by the BBAM (DECC, 2009) was conducted within an area bounded by the first 20 metres of the transect and extending 10 metres either side as shown in **Figure 2-1**. Photographs were taken at the start and end of each monitoring plot. The location of all vegetation types and monitoring plots are shown in **Figure 2-2**.

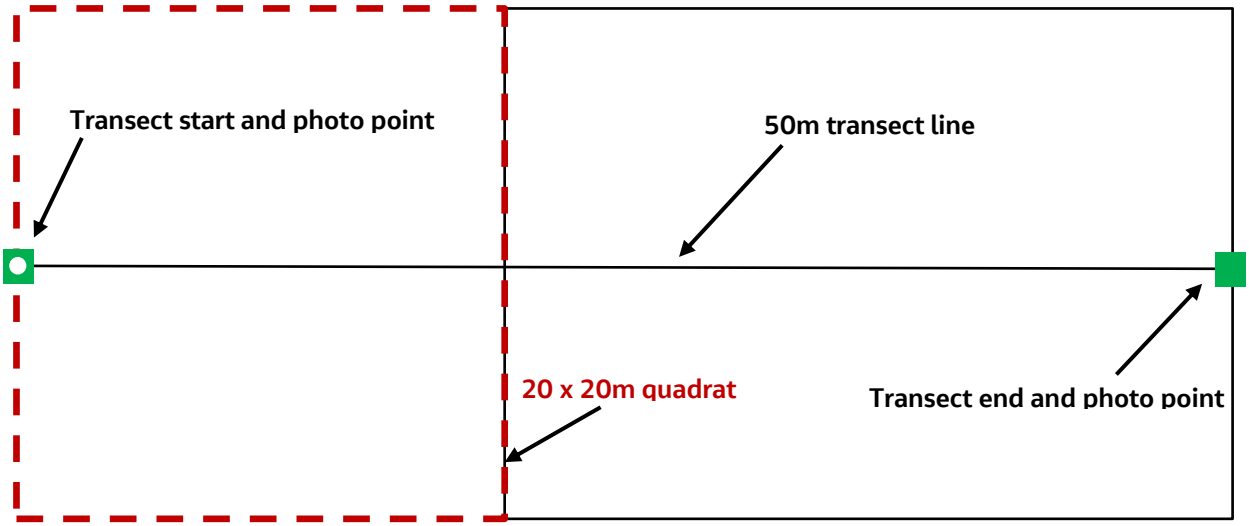

Figure 2-1. Monitoring plot layout

Data collected during each monitoring year has been collated into one electronic database using Microsoft Excel, along with the NGH Environmental (2014) baseline data and the benchmark data for each vegetation community to enable future analysis of data. Jacobs has used the Modified Braun Blanquet method (see **Table 2-2**) for recording floristic abundance data within each monitoring plot. This method has been applied since the commencement of the monitoring program.

Table 2-2. Modified Braun Blanquet scale method used for the monitoring survey

Modified Braun Blanquet criteria (plant cover abundance scale)	
1	1 to a few individuals present, less than 5% cover
2	Many individuals present, but still less than 5% cover
3	5-<20% cover
4	20-<50% cover
5	50-<75% cover
6	75-100% cover

Photographs of each monitoring plot are captured annually using regular photo points.

The coordinates for each monitoring plot are provided in **Table 2-3** to enable repeat and consistent monitoring in the future.

Table 2-3. Coordinates for each of the monitoring plots

Plot Name	Transect start		Transect end	
	Easting*	Northing*	Easting*	Northing*
M01	501365.4948	6498409.989	501388.4344	6498371.304
M02	501144.511	6498635.457	501106.7714	6498605.313
M03	500822.2086	6498302.868	500820.4033	6498254.1
M04	501271.0288	6498145.767	501221.3488	6498151.204

* Co-ordinates are in MGA zone 54 relative to the GDA94 datum

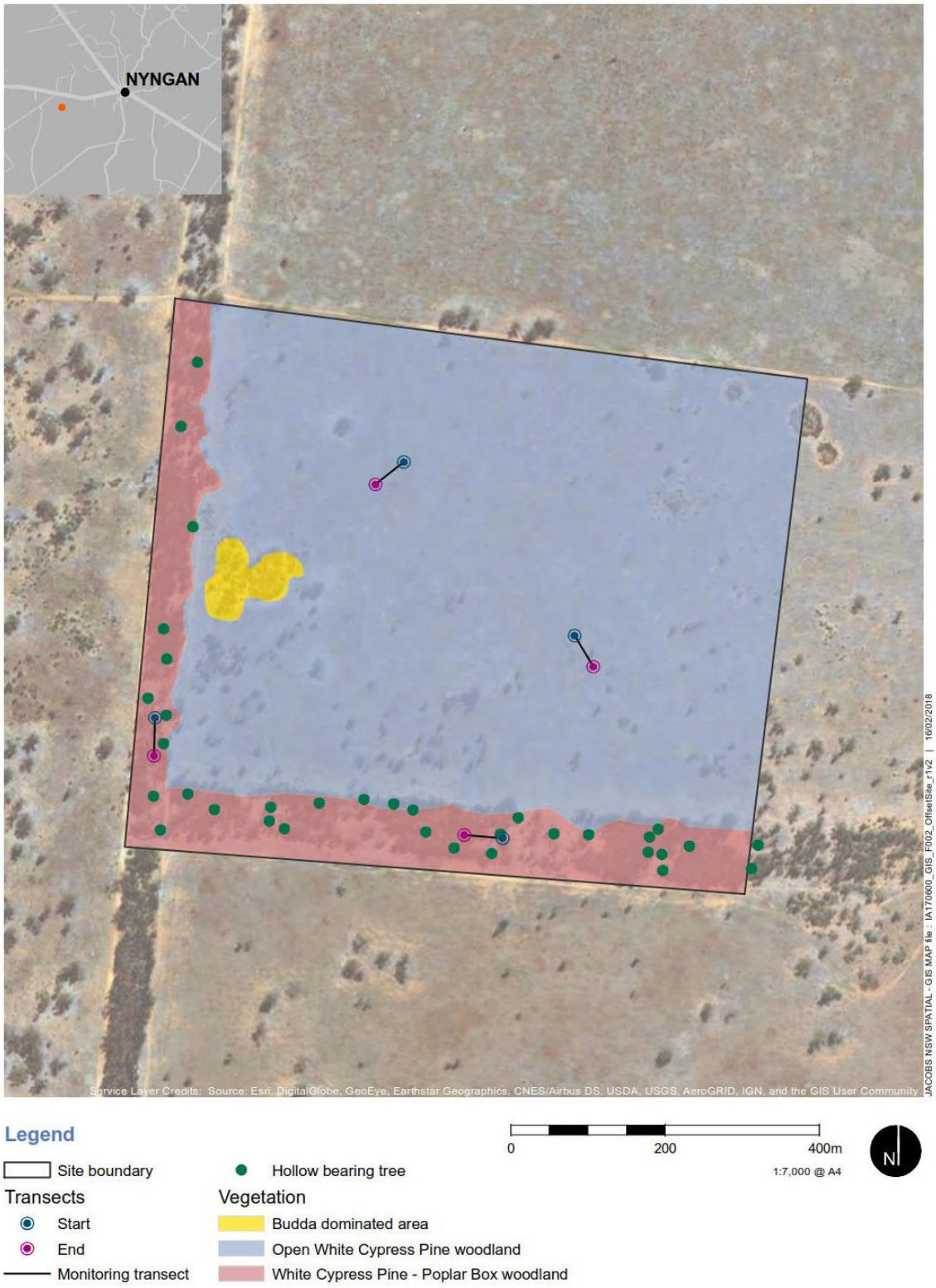

Figure 2-2. Vegetation types, hollow bearing trees and monitoring plots within the Nyngan offset site

2.2.2 Habitat evaluation

General habitat notes were made for the entire offset site whilst detailed habitat notes were taken at each of the monitoring plot locations and included the presence of habitat trees, logs and opportunistic fauna observations. In addition to, the percentage cover of the following habitat features within the entire 50 x 20 metres monitoring plots were recorded:

- Tussock grasses
- Chenopod shrubs
- Mulga (or other overstorey species)
- Bare ground
- Cracking clay
- Rocks and logs.

2.2.3 Fencing evaluation

Fences were inspected for any required maintenance issues whilst driving around the perimeter of the offset site (where safely accessible) and whilst traversing the site by foot during monitoring plot surveys.

2.2.4 Grazing pressure

Grazing pressure is determined by visual inspections for fauna.

2.2.5 The Nyngan Solar Plant revegetation area - assessment

The revegetation area within the Nyngan Solar Plant site was assessed by a count of planted species to determine approximate percentage survival rates and for weed infestation. A general plant species list was created for the area and any management actions listed. Photographs of each monitoring plot are captured annually using regular photo points.

2.2.6 Climatic conditions

Nyngan is located in a typically dry, semi-arid region that experiences low annual rainfall. Following drought years in 2018 and 2019, the previous three years, from 2020 to 2022, had many months of above average rainfall due to repeat La Niña events. However, 2023 saw a rapid decline in rainfall, equating to 343 mm, falling below the annual average of 459 mm for Nyngan. In January 2024, rainfall was above average at 56.4 mm. Significant rainfall events occurred in 2021 (February, March and November), 2022 (April, May, August and October) and 2023 (March, June, July, November and December). A decline in recent rainfall has resulted in a minor reduction for plant conditions, impacting on growth and diversity, as observed during the Year 7 survey (see **Figure 2-3**).

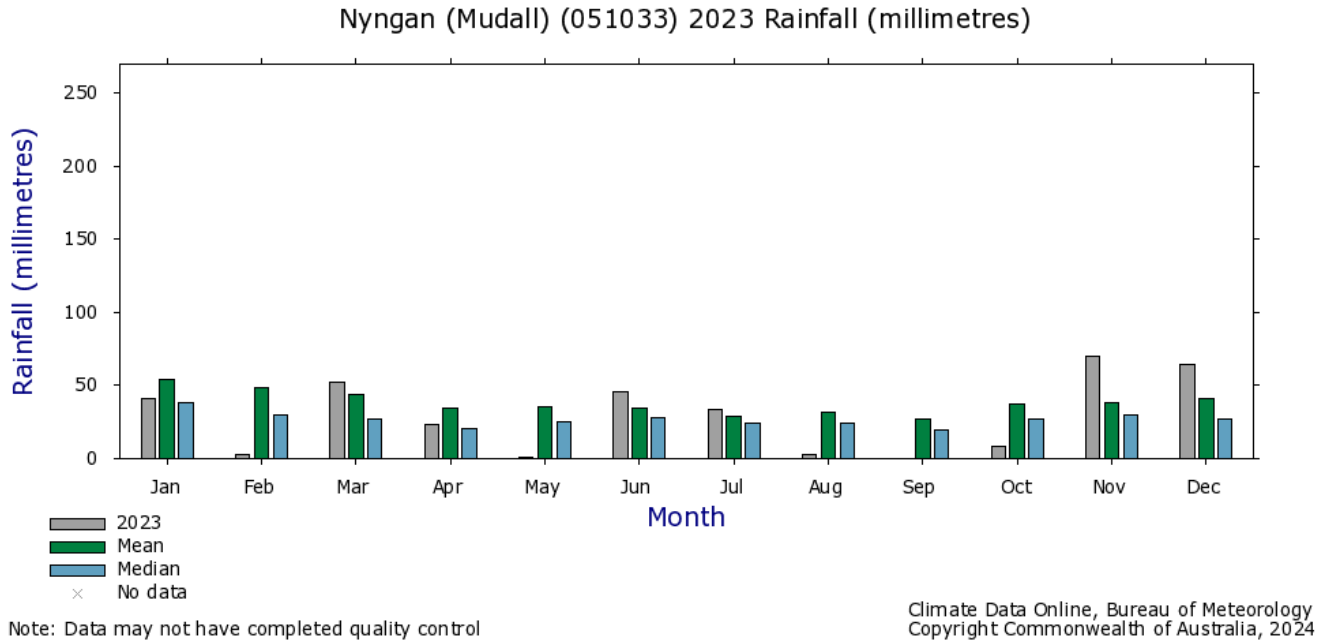

Figure 2-3. Rainfall preceding Year 7 (2023) monitoring (source: Australian Bureau of Meteorology)

3. Monitoring results

3.1 Plot data descriptions and benchmark comparisons

The data and description of the monitoring results for each surveyed vegetation community are listed below. Photographs taken at the start of each monitoring plot are also provided in **Sections 3** and **4**. A species list specific to the 20m x 20m monitoring plot within the larger transect area is provided in **Appendix A**.

3.1.1 Open White Cypress Pine Woodland

The Open White Cypress Pine Woodland community is the dominant vegetation type within the offset site (approximately 41.55 hectares). The overstorey is sparse and comprised of scattered patches of *Callitris glaucophylla* (White Cypress Pine) with the occasional mature *Eucalyptus populnea* subsp. *bimbil* (Poplar Box). The mid-storey is also very sparse and mostly comprised of regenerating *Callitris glaucophylla* (White Cypress Pine). Isolated *Geijera parvifolia* (Wilga) and *Eremophila mitchellii* (Budda) individuals also occur.

The ground cover comprises of a high diversity of forbs and grasses. Dominant species include *Panicum effusum* (Hairy Panic)*, Austrostipa scabra* subsp*. Scabra* (Speargrass)*, Xerochrysum viscosum* (Sticky Everlasting), *Paspalidium constrictum* (Box Grass) and *Enteropogon acicularis* (Curly Windmill Grass)*.* Exotic species *Conyza bonariensis* (Fleabane) was previously recorded frequently, increasing from preceding monitoring periods (due to recent above average rainfall), though the Year 7 monitoring period showed a rapid decline in this weed species.

The monitoring plot data along with the benchmarks for this vegetation type are shown in **Table 3-1** and **Table 3-2**. **Plate 1** to **Plate 4** show the photo assessment points, during Year 6 and Year 7 surveys, for plots M01 and M02. Species richness (the number of native species, shown in **Table 3-1** and **Table 3-2** as 'Native Spp. #') was above the benchmark for the community across both plots and higher than last year. M01 has now exceeded the species richness baseline value recorded by NGH Environmental (2014), though M02 remains slightly under. The overstorey and mid-storey strata are both within the benchmark ranges and are higher than the NGH Environmental (2014) baseline data. This increase is attributed to new foliage growth on existing trees and shrubs (as opposed to new plants reaching the mid and canopy stratums). However, due to the reduction in rainfall, as seen in 2023, the foliage cover of overstorey and mid-storey species have overall marginally declined since the previous year (Year 6), though some areas were showing increased foliage.

Native grass cover surpassed the benchmark and baseline values for this community after the considerable increases observed in 2020 and 2021 (following drought). Although native grass cover has slightly decreased in 2023, due to less favourable climatic conditions, cover remains above benchmark and baseline values. Additionally, native vegetation groundcover-other was within the benchmark for this community in previous years and has maintained coverage since last year (particularly forbs such as *Calotis lappulacea, Chrysocephalum apiculatum* and *Rhodanthe floribunda*). Groundcover shrub was recorded within the benchmark and was equal to the baseline (NGH Environmental, 2014) for M02 and slightly above the baseline (NGH Environmental, 2014) for M01. There were slight increases in groundcover shrub for M01 compared to last year, although the cover in M02 remained consistent. As per previous surveys, no hollow bearing trees (HBTs) were recorded in these plots and fallen timber remained below benchmark maximum levels. Fallen timber has increased in Plot M01 since the 2014 baseline survey.

Overall, the Open White Cypress Pine Woodland community remains in moderate condition. This year has seen a slight increase in species richness, likely due to less competition from native grasses in M01 and M02, which have now enabled some smaller herbs and chenopod species to establish. The decrease in annual rainfall has started to reverse the dominance of native grasses, allowing more groundcover species to establish, displaying a natural succession of the ecosystem. The increased regeneration of overstorey species in M02, such as White Cypress Pine, is further evident since last year (Year 6) and likely to continue over time. M01 showed a slight decrease in overstorey species, though mid-storey species were seen to have increased in cover since last year (Year 6). The health and condition of native plants have also been maintained and can be seen in **Plate 1** to **Plate 4**. With the continued absence of non-native grazing animals, improvement in this community is likely,

though a predicted El Niño will likely see a continued decrease in vegetation cover and an alteration in species diversity. Recruitment of Eucalypt species remains low in these areas and may require more years of favourable weather conditions to allow for higher seed dispersal and germination. It is possible the severe drought years of 2018 and 2019 continue to influence the regeneration of eucalypts in the locality.

Plate 1. Open White Cypress Pine Woodland – Plot M01 Year 6 (December 2022)

Plate 2. Open White Cypress Pine Woodland – Plot M01 Year 7 (January 2024)

Plate 3. Open White Cypress Pine Woodland – Plot M02 Year 6 (December 2022)

Plate 4. Open White Cypress Pine Woodland – Plot M02 Year 7 (January 2024)

Table 3-1. Benchmark and monitoring plot data comparison for Open White Cypress Pine Woodland Plot M01

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Mid-storey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Benchmark	15	3%	22%	0%	30%	5%	30%	2%	10%	2%	30%	0.1	20
Baseline (NGH Env. 2014)	28	0%		0%		58%		4%		24%		0	5
Yr 1 M01	30	0%		0%		44%		0%		34%		0	1
Yr 2 M01	26	1%		1%		22%		0%		16%		0	15
Yr 3 M01	17	1%		1%		2%		1%		5%		0	10
Yr 4 M01	25	3%		1%		40%		3%		8%		0	10
Yr 5 M01	29	4%		2%		45%		4%		10%		0	10
Yr 6 M01	23	6%		3%		65%		5%		15%		0	10
Yr 7 M01	30	3%		4%		64%		6%		12%		0	12

Table 3-2. Benchmark and monitoring plot data comparison for Open White Cypress Pine Woodland M02

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Mid-storey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Benchmark	15	3%	22%	0%	30%	5%	30%	2%	10%	2%	30%	0.1	20
Baseline (NGH Env. 2014)	29	0%		0%		50%		2%		30%		0	17
Yr 1 M02	30	3%		0%		44%		0%		46%		0	1
Yr 2 M02	23	3%		<1%		22%		0%		10%		0	14
Yr 3 M02	16	3%		1%		3%		2%		3%		0	15
Yr 4 M02	21	5%		3%		40%		2%		20%		0	15
Yr 5 M02	28	6%		4%		57%		3%		25%		0	15
Yr 6 M02	21	7%		5%		65%		2%		30%		0	15
Yr 7 M01	24	8%		3%		52%		2%		30%		0	15

3.1.2 White Cypress Pine – Poplar Box Woodland

The White Cypress Pine – Poplar Box Woodland community is restricted to linear strips approximately 45 to 75 metres wide along the western and southern boundaries of the offset site and occupies approximately 8.5 hectares (see **Figure 2-2**). The overstorey is dominated by *Callitris glaucophylla* (White Cypress Pine) with mature *Eucalyptus populnea* (Poplar Box) scattered throughout. In more open areas, *Eucalyptus populnea* (Poplar Box) is dominant. *Eucalyptus intertexta* (Gum-barked Coolabah) is also present to a lesser extent occurring as occasional individuals. Dense *Callitris glaucophylla* (White Cypress Pine) recruits form a distinct small tree layer across much of the area. The mid-storey shrub layer is generally sparse and restricted to occasional individuals of *Eremophila mitchellii* (Budda), *Eremophila longifolia* (Berrigan) and *Dodonaea viscosa* subsp. *mucronata* (Sticky Hopbush). *Einadia nutans* subsp. *nutans* (Climbing saltbush) is a common low shrub along with *Sclerolaena birchii* (Galvanised Burr) and *Maireana microphylla* (Eastern Cottonbush). The ground cover is patchy and dominated by species such as *Thyridolepis mitchelliana* (Mulga Mitchell Grass), *Enteropogon acicularis* (Curly Windmill Grass), *Brunoniella australis* (Blue Trumpet) and *Sida cunninghamiana* (Ridged Sida).

The monitoring plot data, along with the benchmarks for this vegetation type (DECC, 2008), are shown in **Table 3-3** and **Table 3-4**. **Plate 5** to **Plate 8** show the photo assessment points, during Year 6 and Year 7 surveys,

for plots M03 and M04. Species richness (which is the number of native species, shown in **Table 3-3** and **Table 3-4** as 'Native Spp. #') remains above the benchmark for this community and above the baseline scores (NGH Environmental, 2014) in both plots, though has shown a slight decrease since last year (Year 6) likely due to a reduced annual rainfall and seasonal variation. Overstorey cover is above the benchmark range for both plots, where M04 is also above the baseline value (NGH Environmental, 2014). Mid-storey cover is within the benchmark range and consistent with the baseline values (NGH Environmental, 2014), though has seen a slight decrease since the previous year (Year 6). The recruitment of new trees is still low following drought years of 2018 and 2019.

Grass cover was marginally less than last year (Year 6), though remains substantially higher than previous years and well above the benchmark range and baseline levels. This is largely due to the recent abundance of native *Paspalidium constrictum* (Box Grass) and *Panicum effusum* (Hairy Panic) grass, likely responding to consecutive years of higher rainfall since the years of drought in 2018 and 2019. Groundcover shrubs have slightly decreased in M03, though have increased in M04. This variation is likely a result of competition with other native species of grasses, forbs and mid-storey shrubs. Importantly, groundcover shrubs, however, still remain within the benchmark range for the community. Other native ground cover, such as forbs, has also decreased slightly from last year, likely as a result of decreased annual rainfall and seasonal variation, being surveyed later in summer (January). Within plots M03 and M04, the dominance of native grasses is part of the natural succession of the ecosystem, and continued decreases in rainfall may reverse this trend. Other native ground cover scores still exceed the benchmark range and baseline values, in both plots, for this community.

Whilst HBTs occur within the wider area of this community, none were recorded in the monitoring plots, which is below the benchmark and baseline (NGH Environmental, 2014) for this community. The values for fallen timber in the monitoring plots have increased since last year and remain higher than the benchmark and baseline values (NGH Environmental, 2014). The increase in fallen timber would also contribute to the overall decrease in overstorey and mid-storey cover identified during the monitoring period for Year 7.

Overall, the White Cypress Pine – Poplar Box Woodland community is in moderate condition and has overall, maintained condition compared to last year's values. Areas of native vegetation cover has marginally reduced since last year, though this is likely attributable to natural seasonal variation and a decline in annual rainfall. Despite this, the community continues to exceed a number of the benchmarks and baseline values (NGH Environmental, 2014), pertaining to species richness, native grasses, native groundcover (forbs) and, in M04, overstorey cover. Recruitment of Eucalypt species remains low in these areas and may require more years of favourable weather conditions to allow for higher seed dispersal and germination. It is possible the severe drought years of 2018 and 2019 continue to influence the regeneration of Eucalypts in the locality. With the continued absence of non-native grazing animals, improvement in this community is probable, though a predicted El Niño will likely see a continued decrease in vegetation cover and an alteration in species diversity.

Table 3-3. Benchmark and monitoring plot data comparison for White Cypress Pine – Poplar Box Woodland – plot M03

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Mid-storey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Benchmark	15	3%	22%	0%	30%	5%	30%	2%	10%	2%	30%	0.1	20
Baseline (NGH Env. 2014)	24	29%		0%		32%		6%		10%		2	35
Yr 1 M03	31	39%		0%		18%		0%		56%		0	7
Yr 2 M03	12	32%		2%		0%		2%		18%		0	36
Yr 3 M03	4	30%		2%		0%		2%		7%		0	35
Yr 4 M03	21	32%		4%		10%		4%		45%		0	36
Yr 5 M03	29	34%		5%		48%		6%		55%		0	36
Yr 6 M03	32	36%		6%		58%		6%		40%		0	36

Yr 7 M03	29	23%	4%	54%	4%	32%	0	52

Table 3-4. Benchmark and monitoring plot data comparison for White Cypress Pine – Poplar Box Woodland – plot M04

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Mid-storey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Benchmark	15	3%	22%	0%	30%	5%	30%	2%	10%	2%	30%	0.1	20
Baseline (NGH Env. 2014)	21	22%		0%		18%		10%		6%		1	36
Yr 1 M04	36	28%		0%		8%		0%		28%		0	2
Yr 2 M04	19	25%		0%		2%		0%		8%		0	38
Yr 3 M04	7	25%		0%		0%		3%		5%		0	38
Yr 4 M04	24	27%		2%		15%		4%		50%		0	38
Yr 5 M04	25	29%		2%		38%		7%		58%		0	38
Yr 6 M04	29	30%		3%		48%		4%		46%		0	38
Yr 7 M04	28	30%		0%		46%		6%		36%		0	40

Plate 5. White Cypress Pine – Poplar Box Woodland - Plot M03 Year 6 (December 2022)

Plate 6. White Cypress Pine – Poplar Box Woodland - Plot M03 Year 7 (January 2024)

Plate 7. White Cypress Pine – Poplar Box Woodland - Plot M04 Year 6 (December 2022)

Plate 8. White Cypress Pine – Poplar Box Woodland - Plot M04 Year 7 (January 2024)

3.2 Monitoring survey results summary and discussion

The observed changes in the vegetation of the offset site are summarised and discussed below.

3.2.1 Native species richness

Native species richness (labelled Native Spp. # in tables above) has further increased in plots M01 and M02 and remains above benchmark levels for all plots (see **Figure 3-1**). Plots M03 and M04 recorded a slight decrease in species since last year due to of less favourable climatic conditions and seasonal variations, having surveys conducted later in summer (January). Additionally, several small chenopod and perennial herb species have likely been replaced by fast growing native grasses. The dominance of native grasses is part of the natural succession of the ecosystem, and future decreases in rainfall may reverse this trend. Overall, the groundcover grass and forb component of the vegetation seems to be the dominating vegetation within the community, with many previously recorded annual and short-lived perennial species reappearing. Refer to **Appendix A** for the full list of native species in each plot.

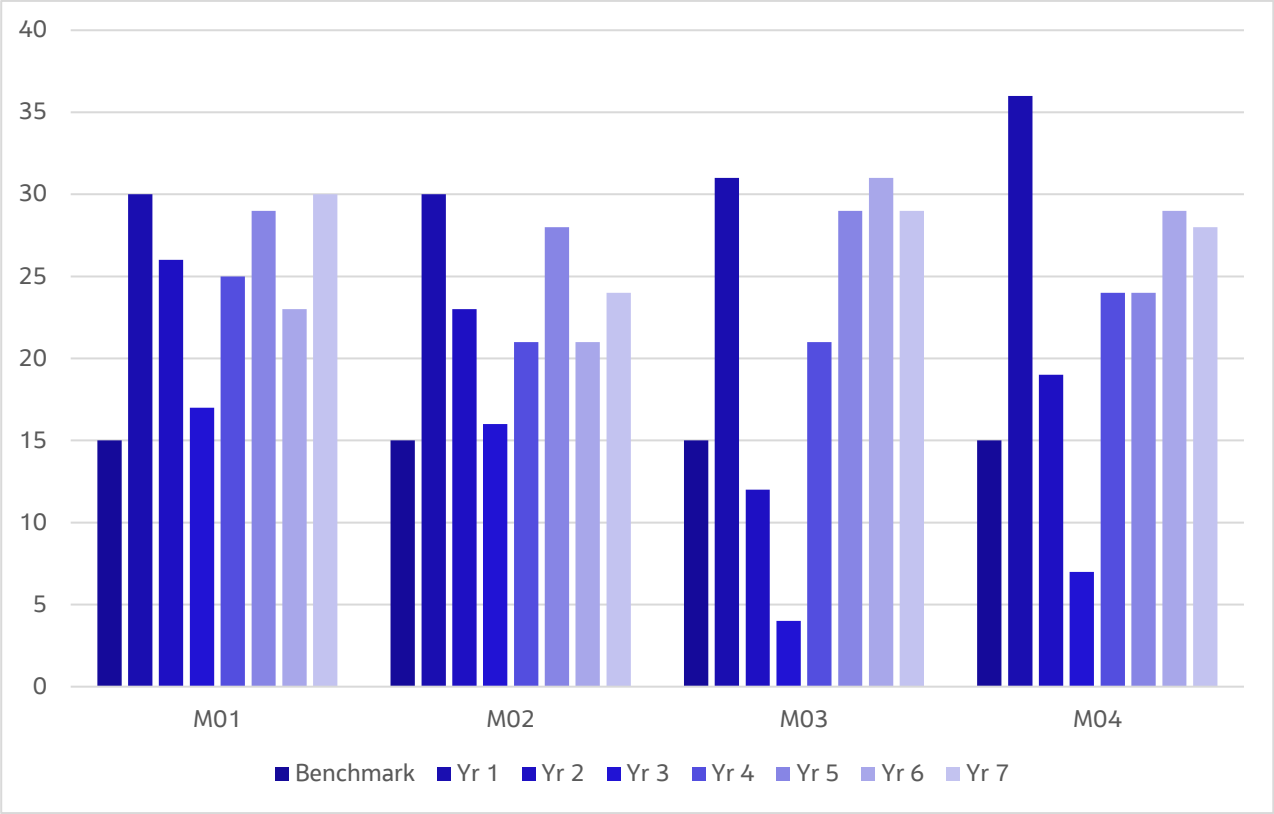

Figure 3-1. Changes in number of native species (species richness) assessed against benchmark levels

3.2.2 Cover of native and exotic vegetation

In comparison with last year, the cover scores for native vegetation have overall decreased within all categories. The groundcover grasses and groundcover-other (forbs) showed the most pronounced reduction in comparison. The groundcover has reduced with some previously recorded annual and short-lived perennial species no longer apparent. The overall decrease is primarily due to a reduction in favourable climatic conditions, and fallen timber, reducing the overstorey shrub cover. However, because of recent years' previous wet conditions, groundcover grasses continued to demonstrate substantial dominance and remain higher than Year 5, and far-higher than Years 2 and 3 (which were low-rainfall years). The significant cover of native grass, being significantly above benchmark, has apparently increased competition for space, light and nutrients in the ground layer, and has resulted in slight decreases of groundcover-shrub and groundcover-other (forbs) categories. Small chenopods and herbs have occasionally been replaced by grass tussocks. This trend was predominantly noted in the Year 6 monitoring period, and less so during Year 7. However, conversely the overall reduction in vegetation cover has enabled a higher diversity of native species to establish.

There has been a significant reduction in the abundance of exotic species when compared to data from Year 6 (see **Figure 3-2.** Changes in the cover of native and exotic vegetation

). This change is likely due to previously recorded annual and short-lived perennial weeds no longer being apparent, a reduction in annual rainfall and previous weed management practices being undertaken on the site. Additionally, native grass cover is likely beneficial in suppressing / outcompeting some other weed species previously recorded.

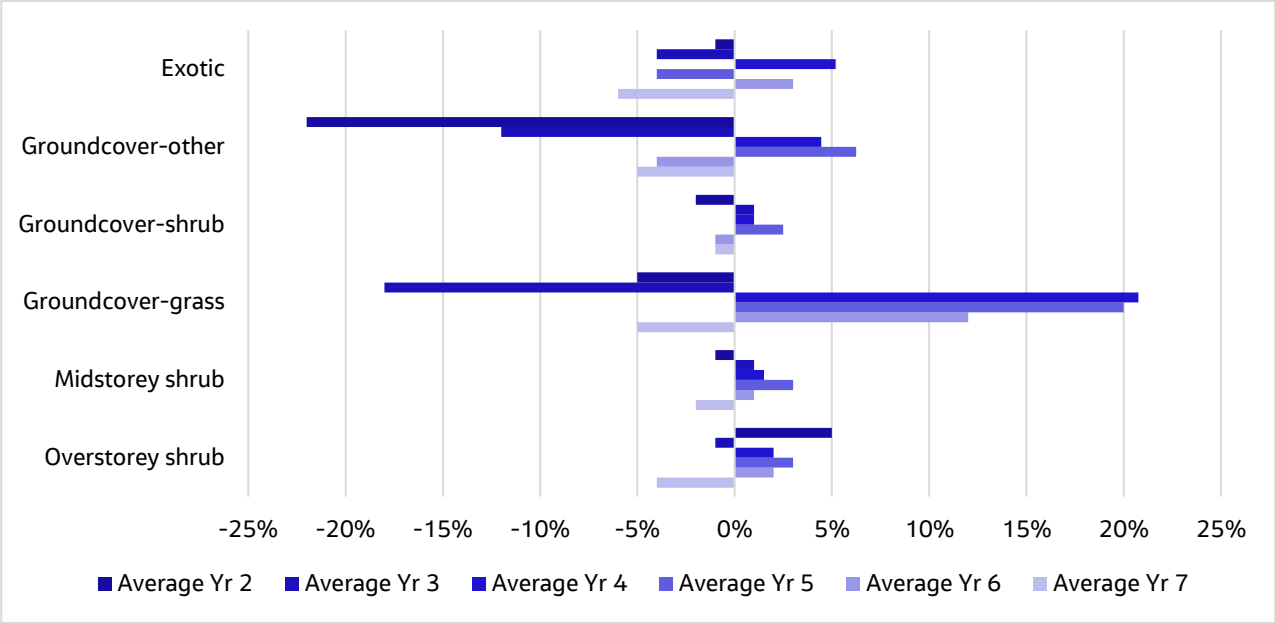

Figure 3-2. Changes in the cover of native and exotic vegetation

As explained above, a slight decrease of native groundcover-other for M01, M03 and M04 this year is likely a result of competition with native grass species which have continued to dominate the groundcover strata, due to previous above average rainfall from 2020 to 2022. Notably, for majority of the plots, the cover scores for the groundcover-other category continue to exceed or are equal to the benchmark maximum for this vegetation community. Cover of forbs slightly decreased this year in M01, M03 and M04, though all remain within or above benchmark range (see **Figure 3-3**). Importantly these vegetation communities can naturally occur with minimal forbs.

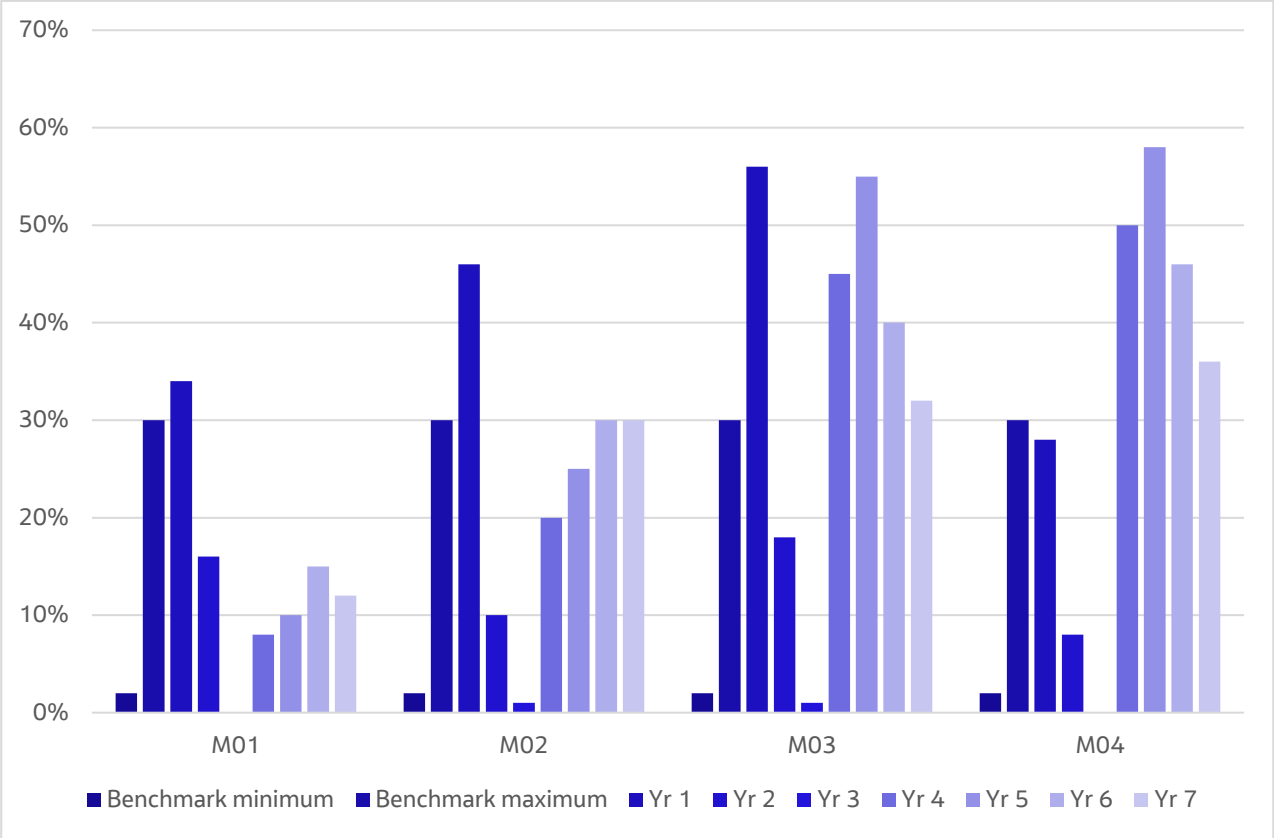

Figure 3-3. Native groundcover – other (percentage cover)

Figure 3-4 demonstrates the native groundcover-grass has continued to exceed the benchmark maximum in all monitoring plots, despite showing a decline since the previous year (Year 6). This pattern is attributable to favourable climatic conditions, although beginning to show patterns of reduced annual rainfall in western NSW.

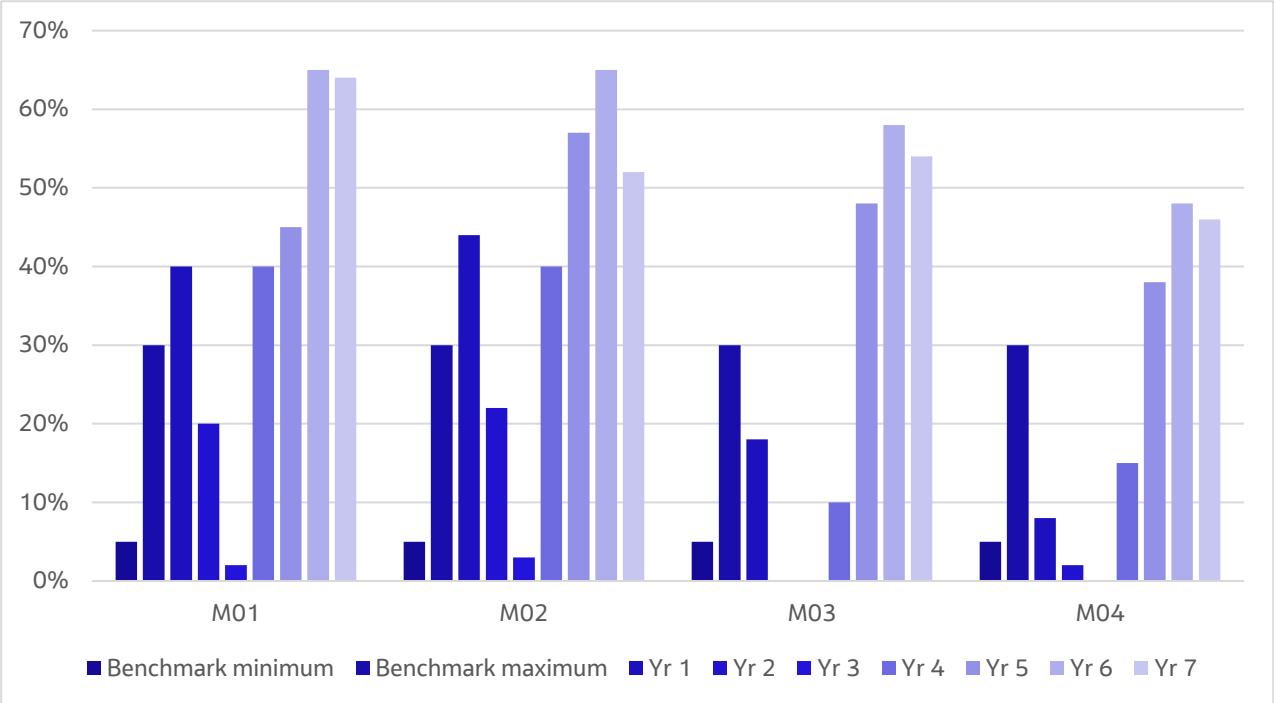

Figure 3-4. Native groundcover - grass (percentage cover)

In relation to native groundcover-shrubs (refer to **Figure 3-5**), the benchmark levels were met for all of M01, M02, M03, M04 despite a slight decrease in cover recorded in the M03 plot this year. Smaller shrubs occurring in the groundlayer have been replaced by recent growth of native grasses, whereas larger shrubs are likely to persist.

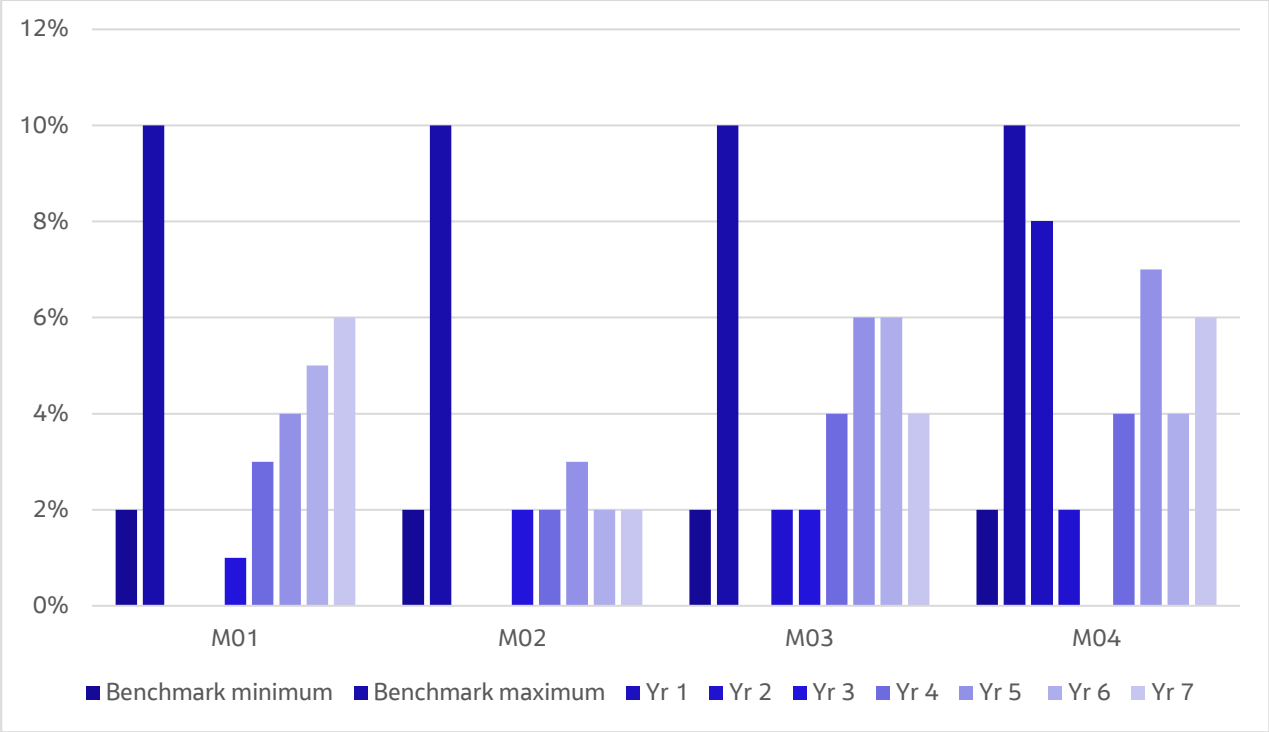

Figure 3-5. Native Groundcover – shrubs (percentage cover)

3.2.3 Discussion

The observed marginal reduction in native vegetation cover at the offset site is consistent with the reduced annual rainfall experienced in 2023. Conversely, a reduction in percentage cover of overall vegetation has enabled more native species to establish in areas as there has been less competition for space, light and nutrients in the groundlayer.

Grazing pressure on grasses and herbs by kangaroos, domestic stock and feral pests has also been reduced by the exclusion fencing surrounding the offset site. Due to these factors, the Year 5 (2021) and Year 6 (2022) ecological monitoring results showed significant increases in native grass and shrub covers. This year (Year 7) shows similar diversity and cover values with improvements to species richness, however, minor decreases in density scores were noted, attributable to the reduction in annual rainfall.

The Year 7 ecological monitoring has shown an improvement in the diversity of native plants in the White Cypress Pine – Poplar Box Woodland community, with some new native species recorded for the first time within plots. New species identified within the monitoring M01, M02 and M04 plots include the following:

- M01: *Enteropogon acicularis, Rhyncharrhena linearis, Einadia nutans subsp. nutans, Euphorbia drummondii, Boerhavia domini, Oxalis perennans,* and *Enchylaena tomentosa*
- M02: *Brunoniella australis, Oxalis perennans, Maireana villosa* and *Sclerolaena bicornis var. bicornis*
- M04: *Solanum esuriale*.

Overall, the percentage cover of native species in the vegetation communities has decreased slightly, due to dominance by native grasses since 2020. This is natural succession, and a return to lower rainfall may allow some species to return once grass thins out again, which is beginning to be evident during this year's monitoring period. Annual and short-lived perennial groundcover species are likely to naturally fluctuate in abundance, as a

response to climatic conditions and competition, and are likely to persist on the site in the form of a soil-stored seedbank during unfavourable conditions. Importantly, the monitoring plots are generally within or exceeding the benchmark and baseline values, in addition to receiving ongoing management. Future fluctuations in vegetation quality are anticipated to primarily stem from seasonal changes, resulting in periodic fluctuations in vegetation quality, rather than experiencing ongoing exponential growth.

The native grass cover scores in 2023 are exceeding the benchmark scores for both vegetation communities, as well as the baseline study scores. Similarly, cover scores of native forbs and herbs in White Cypress Pine – Poplar Box Woodland and Open White Cypress Pine Woodland communities are within or above the benchmark scores. The slight decreases in overstorey and mid-storey cover scores are attributed to lower rainfall and fallen logs. However, some regeneration of overstorey and mid-storey species was occurring throughout the offset site. White Cypress Pines appear to be regenerating well across the offset site. Recruitment of new Eucalypts remains low in these areas and may require more years of favourable weather conditions to allow for higher seed dispersal and germination. It is possible the drought years of 2018 and 2019 have impacted the regeneration of Eucalypts in the locality.

The overall condition of native vegetation on the offset site has been maintained since last year, with some improvements to diversity, though marginally lower overall cover values. This is likely to be caused primarily by increased rainfall events since the drought periods in 2018 and 2019, as well as lower levels of grazing by herbivores.

3.3 Weeds, disturbance and pests

Overall, weed infestation across the offset site was low to moderate this year, with a 6% decrease in the monitoring plots from last year (Year 6). The highest weed cover was identified within the M04 plot, with *Conyza bonariensis* (Fleabane) equating to the highest weed cover score. During the Year 6 monitoring period, *Conyza bonariensis* (Fleabane) was shown to substantially increase due to continued above-average rainfall. As this weed species is an annual herb that generally flowers throughout the year (Australian National Botanic Gardens, 2024), it is surmised that a reduced rainfall, seasonal variation, natural competition with native species and previous weed management practices undertaken, have substantially reduced the occurrence of this species.

Additionally, the spraying of *Carthamus lanatus* (Saffron Thistle) undertaken in 2021 has greatly reduced the abundance of this species, with no records observed within the monitoring plots this year. Importantly, substantial rainfall has also allowed for further growth of native grasses and shrubs which may be acting to suppress other weeds. None of the weeds identified within the site are declared as state or regional priority weeds under the *Biosecurity Act 2015* or the Western Regional Strategic Weed Management Plan 2023-2027 (LLS, 2022).

As noted in previous monitoring reports, historic clearing (prior to AGL acquiring the offset site) was evident across the offset site, with several stumps and stags remaining.

No new damage or other signs of recent goat (*Capra sp*.) and sheep (*Ovis aries*) activity was observed in the Year 7 monitoring. However, two wild pigs (*Sus sp*.) were observed within the offset site on January 18, 2024. Pig impacts can include large areas of bare ground and soil disturbance. Predation, habitat degradation, competition and diseases transmission by feral pigs is listed as a 'key threatening process' under Schedule 4 of the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999). A threat abatement plan exists for this process (DEH, 2005) and has two broad goals:

- To protect nationally listed threatened species and ecological communities from predation, habitat degradation, competition and disease transmission by feral pigs; and
- To prevent further species and ecological communities from becoming nationally threatened or extinct due to predation, habitat degradation, competition and disease transmission by feral pigs (DEH, 2005).

The plan outlines the environmental impacts caused by feral pigs, control techniques and the roles and responsibilities of landowners, communities and authorities in managing the pest. **Table 5-1** outlines the offset

site management measures as stated in the BOMP (NGH Environmental, 2014) and list the exclusion of feral pigs as a management action. If pigs are found on the site in future, they should be managed through trapping in the first instance, as recommended by the Central West Local Land Services (Mr G Grahame 2018, pers. comm., 30 January). Importantly, although this pest species was observed within the offset site, there were no notable impacts identified, such as diggings or large areas of bare ground.

Additionally, Noisy Miners (*Manorina melanocephala)* were noted within the offset site and were observed actively chasing other birds away from occupied areas. Although, the Noisy Miners population within the offset site has notably declined since the beginning of the monitoring process when they were first observed. Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners is also listed as a 'key threatening process' under Schedule 4 of the *BC Act 2016*. Noisy Miners favour open, lightly timbered areas and habitat edges (NSW SC, 2013) and as outlined in the BOMP (NGH Environmental, 2014), this species is likely to have benefitted from the past clearing at the site and linear strips of vegetation along the western and southern boundaries. It is likely that Noisy Miners may deter Grey-crowned Babblers, as well as other woodland birds, from the offset site. Recent fencing of the site may assist in the natural regeneration of the site along the more vulnerable edges. Continuing to reduce the edge effects by increasing the general density of vegetation across the more open areas may counteract this effect by reducing the preferred habitat of Noisy Miners. It would also provide additional habitat for other native bird species to compete with Noisy Miners. The Grey-crowned Babbler is listed as a species that may be adversely affected by Noisy Miners (NSW SC, 2013). Although they were detected on the site during this year's monitoring period, no Grey-crowned Babbler nests were observed despite the presence of suitable habitat similar to that at the development site where numerous nests were previously detected. It is possible that Noisy Miners are preventing Grey-crowned Babblers from breeding at the offset site.

3.4 Fauna Habitats

Habitat within the offset site comprises of fallen logs, standing dead trees (stags), hollow bearing trees and grassy/forb groundcover (see **Plate 9** to **Plate 13**). The higher density woodland areas along the southern and western boundaries of the offset site are abundant in fallen timber and the overstorey provides nesting and roosting habitat for a range of woodland birds. Mature Poplar Box and Gum-barked Coolabah trees provide hollows of various sizes as mapped by NGH Environmental (2014). Tree hollows provide potential habitat for a wide range of bats, woodland birds, owls and arboreal mammals such as gliders. High grass cover, as seen within the monitoring pots, is beneficial for reptiles, small mammals and foraging birds.

Searches were undertaken for Grey-crowned Babbler nests whilst undertaking monitoring of plots M03 and M04 within the White Cypress Pine – Polar Box Woodland community and whilst traversing the offset site. No nests were observed; however, Grey-crowned Babblers were observed calling within the offset site, located within the woodland, along the western boundary. As described by NGH Environmental (2014) the presence of the aggressive Noisy Miner within the White Cypress Pine – Polar Box Woodland areas and less commonly in the Open White Cypress Pine Woodland community may be a significant factor in the absence of this species. This concept provides evidence that the Noisy Miner population within the offset site has declined over the entirety of the monitoring process to date. Therefore, this has provided more suitable habitats for the Grey-crowned Babbler within the offset site. With a continuation of improving and maintaining the vegetation communities within the offset site, the Grey-crowned Babbler is likely to eventually establish breeding site.

The greater area across the centre of the offset site contains scattered trees with a grassy/forb groundcover. Scattered fallen timber and small stags also provide habitat in this area. Numerous common species of woodland birds were observed foraging within the grassy groundcover and perching on small trees and stags. Emus were observed within the site in 2021. Additionally, a Sand Goanna (*Varanus gouldii*) (see **Plate 13**) was observed during this year's monitoring surveys within the White Cypress Pine – Polar Box Woodland habitat, located along the western boundary. **Appendix A**,

Table A-2 provides a list of fauna species identified during opportunistic surveys undertaken this year.

Overall, the habitats within the offset site appeared to be consistent with those described by NGH Environmental (2014). The installation of fencing approximately six years prior to the Year 7 ecological monitoring survey is

likely to be effective in excluding animal pests and other herbivores from the offset site, which will assist in the natural regeneration of the site and hence improve the vegetative habitats. Fence inspections and repairs, however, are required after this year's monitoring period to determine the entry point/s enabling access for the wild pigs observed on site.

Plate 9. Hollow logs provide suitable habitat for reptiles and ground mammals

Plate 10. Multiple large hollow-bearing trees occur in the southern and western areas of the site

Plate 11. Woodland areas contain habitat features such as wood debris and hollow logs

Plate 12. Open grass habitat with regrowth Cypress pine

Plate 13. Sand Goanna (Varanus gouldii) observed at the southern end of the site (Year 2, 2018)

3.5 Grazing Pressure

The offset site has been fenced for approximately six years at the time of this monitoring survey. A mob of Kangaroos were observed within the offset site this year, in addition to two wild pigs. There was no other evidence of pest species activity observed. Despite the occurrence of the wild pigs, grazing pressure is still considered to be low.

3.6 Fence maintenance

Stock proof fences, approximately 1200 mm high, were installed around the entire perimeter of the offset site in January 2018. The fences appeared well maintained and in near new condition. Fencing comprises of a ring lock style, (and originally included) a single strand of barbed wire along the top (see **Plate 14**).

The top barbed-wire strand of the fencing was removed in 2019 as recommended by Jacobs (2019, Year 2 Survey) to minimize the risk of kangaroo entrapment and mortality. No kangaroo carcasses were observed entangled in the boundary fences in the Year 7 survey.

Gaps under the fence identified in the Year 3 survey were repaired / filled in 2020, as per previous recommendations. Any future animal diggings are to be filled in as soon as possible to prevent entry of animal pests and other herbivores.

Two wild pigs were observed within the offset site during the Year 7 monitoring surveys; therefore, a thorough inspection and repair of the boundary fence is required to prevent access into the offset site by pest animals.

Plate 14. Ring-lock fencing along the southern boundary of the offset site. This style of fencing surrounds the entire perimeter of the offset site

3.7 Recommended future management actions

The following management actions are recommended for the offset site:

- Monitoring and spot-spraying of re-emerging weeds in early spring 2024. Saffron Thistle (*Carthamus lanatus*) should be monitored as this species can rapidly dominate cleared areas. Monitoring of the newly established *Conyza bonariensis* (Fleabane) from the Year 6 monitoring period should also be undertaken, however this weed is resistant to most herbicides and may become less problematic once rainfall averages decrease further.
- Ongoing fence monitoring and repair of any damage observed. Two wild pigs were observed within the offset site, therefore a thorough inspection and repair of the boundary fence of the offset site is required.
- In alignment with the NSW DCCEEW (formally NSW DPE) AEMR-4 recommendations (dated 19 March 2021), a fauna and weeds check(s) (separate to the annual monitoring survey) will be conducted during the year.

4. The Nyngan Solar Plant revegetation area

4.1 Overview and monitoring methodology

It was a condition of approval (COA B18, October 2011) for the Nyngan Solar Plant that visual screening be provided along the southern boundary of the Nyngan Solar Plant site to reduce visual impacts. As per section 6 of the BOMP (NGH Environmental, 2014), the provision of visual screening was to be incorporated with habitat restoration of approximately five hectares of land at the Nyngan Solar Plant site as an additional compensatory environmental measure. In the long-term, this is expected to provide additional habitat for the Grey-crowned Babbler (Vulnerable under *NSW Biodiversity Conservation Act* 2016) in the immediate area where habitat has been removed and where the species is known to occur and breed.

A Landscape Plan was prepared for the revegetation area by First Solar (2013) and planting of the revegetation area was undertaken in accordance with this plan. Measures, additional to the Landscape Plan, that have the objective of enhancing habitat for the Grey-crowned Babbler were outlined in the BOMP (NGH Environmental, 2014) and include:

- Where possible, tubestock and seed used for revegetation would be of local provenance.
- Livestock would be excluded from the revegetation area for the life of the Nyngan Solar Plant.
- Groundcover revegetation would be conducted focusing on establishing a grassy understorey suitable for foraging by the Grey-crowned Babbler. It is proposed to utilise grass species that are known to occur on the site and are considered suitable for revegetation as outlined in Table 6-2 of the BOMP (NGH Environmental, 2014).
- Larger logs that are cleared from other activities within the development site would be placed within the revegetation area to provide additional habitat features.
- Ongoing weed control within the revegetation area would be carried out as described for the development site in the project Operational Environmental Management Plan.

The revegetation area at the Nyngan Solar Plant is divided into two areas, the eastern and western revegetation areas, by a patch of remnant vegetation retained within the site (see **Figure 4-1**). Revegetation occurred in July 2017, and each area has been fenced in its entirety. One monitoring transect (50m x 20m) was established within the larger, eastern revegetation area to identify any natural regeneration diversity and cover in the area (see **Plate 15** and **Plate 16**). A species list specific to the 20m x 20m monitoring plot within the larger transect area is provided in **Appendix A**. An overall assessment was also undertaken for the revegetation area to estimate the survival rate of planted tubestock.

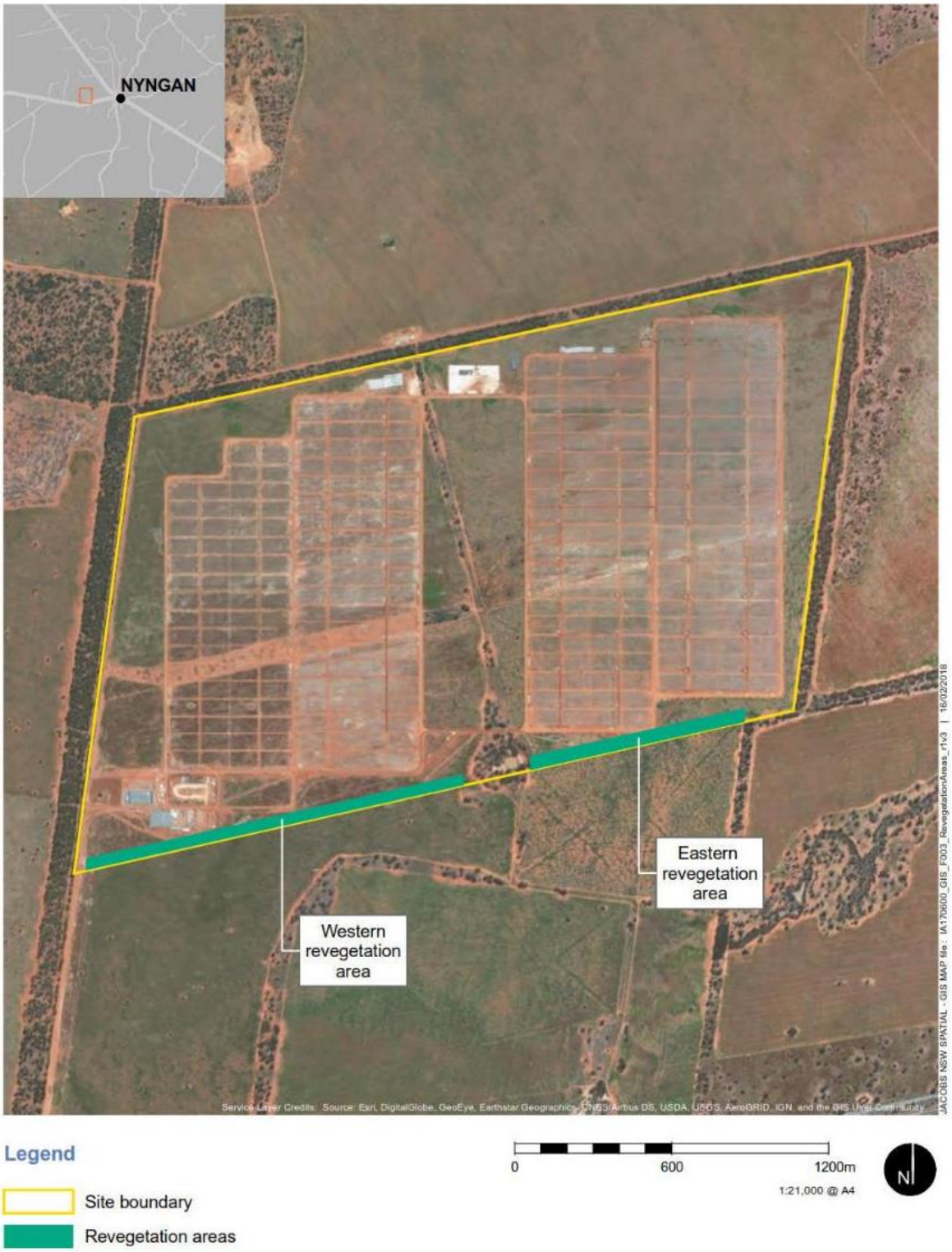

Figure 4-1. Revegetation areas within the Nyngan Solar Plant site

Plate 15. Looking west along the western revegetation area Year 6 (December 2022)

Plate 16. Looking west along the western revegetation area Year 7 (January 2024)

4.2 Revegetation area condition assessment

Monitoring of the revegetation area within the Nyngan Solar Plant site was undertaken on 16 January 2024. The results of the assessment are provided in the following sections along with recommended management actions. Management actions are also outlined in **Table 5-1**, **Section 5**.

4.2.1 Vegetation monitoring

The previous Year 6 monitoring period saw a continuation of favourable weather conditions, which meant that the decline in cover of native vegetation recorded during the drought (2018-2019) was continuing to be reversed. This year, the total overall native vegetation cover for the revegetation area is slightly lower than the previous year, though with a marginal growth in native groundcover-other (forbs) (see **Figure 4-2**). The loss of planted trees from the revegetation area due to drought means that the vegetation cover is still low, however the plants that have survived appear to be in good health and have grown considerably in the last year. Native grass cover continues to dominate the groundcover, resulting in above benchmark values, though saw a slight decline since the previous year (see **Plate 16**). Species richness across the monitoring plot increased from 10 species to 16 species in 2020, and 16 to 27 species in 2021 – showing that natural regeneration is occurring with favourable climatic conditions. Likely due to less competition with native grasses, native forb species have increased in cover, resulting in a higher species richness since the previous year, which recorded 24 species in 2022 and 29 species this year. Additionally, two new native grass species were recorded this year within the revegetation area including *Eragrostis sp.* and *Sporobolus caroli*.

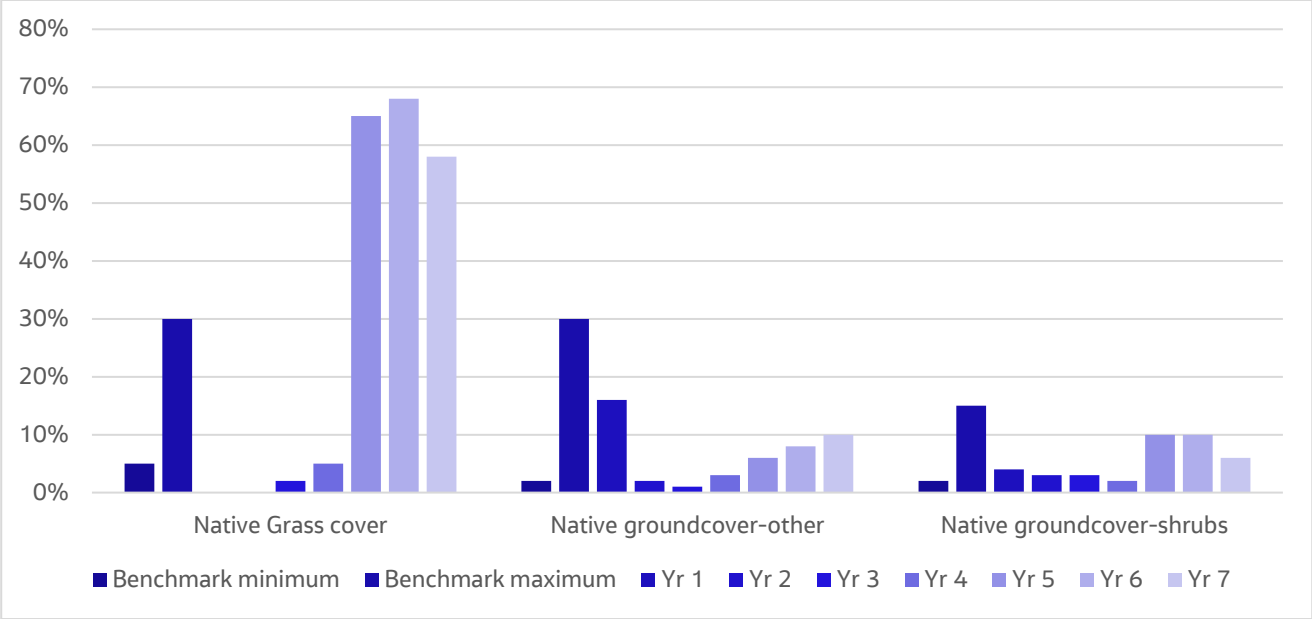

Figure 4-2. Changes in vegetation cover (%) of groundcover types - Revegetation Area

4.2.2 Tubestock survival rate

Tubestock was planted within the revegetation area in July 2017. Following 2018-2019 drought conditions, the estimated survival of tubestock was 10%. There appears to be no further losses of tubestock this year compared to last year's survey. Approximately 66 *Acacia spp.* shrubs, 63 *Eucalyptus spp.* small trees and 22 *Atriplex spp.* large shrubs were recorded within the revegetation area, as well as approximately 12 *Bursaria spinosa* (Sweet Bursaria) and nine *Brachychiton populneus* (Kurrajong). These results have shown a slight increase in the overstorey and mid-storey native vegetation covers, with some regeneration occurring. Some of these specimens have put on significant growth in the past three years (see **Plate 17** and **Plate 18**). Smaller chenopod shrubs are also becoming established in the revegetation area; however, these were not part of original tubestock plantings.

Plate 17. Planted Brachychiton, Eucalyptus and Acacia trees within the revegetation area (December 2022, Year 6)

Plate 18. Planted Acacia trees, looking east along the western boundary of the regeneration area (January 2024, Year 7)

4.2.3 Natural regeneration

A significant amount of natural regeneration occurring within the groundlayer of the revegetation area was observed in the Year 1 (2017) monitoring. With the subsequent dry conditions (2018, 2019) many of the species that were previously apparent were not detected during the Year 2 (2018) survey. Year 3 (2019) survey found a further decline in species with only 10 native species identified within a 20m x 20m plot.

Year 4 (2020) saw a rebound in species richness and cover, with many species appearing that were not present in the previous two years. Further increases in species richness and cover scores occurred in 2021, however a slight decline in species richness was then noted in 2022 (Year 6). This was attributed to competition between native grasses and small chenopod species, where native grass growth had increased due to continued higher rainfall.

During the Year 7 (2023) monitoring period, it was observed that both native grasses and shrubs have declined since the previous year, with a slight increase in native forbs. These trends are a part of natural ecosystem succession, and it is probable that a return to drier conditions would cause a decline in native grass dominance and issue a resurgence of native chenopod and forb species. This process of reversed natural vegetation succession, due to drier conditions, was beginning to be evident during this year's monitoring. It is anticipated that the predicted El Niño event would likely impact vegetation patterns due to changes in precipitation, temperature and other environmental factors. Unfavourable drier conditions may lead to drought stress, with initial changes such as reduced foliage density and shifts in plant species composition. Importantly, continued maintenance and monitoring of the vegetation within the revegetation area, would assist in strengthening the resilience and natural adaptations of the vegetation community to drier conditions and promote biodiversity and ecosystem stability.

A full species list and cover abundance score using the modified Braun Blanquet scale are provided in **Appendix A**.

4.2.4 Fencing

Fences were installed around the entirety of the revegetation area in March 2017 and remain in good condition (see **Plate 19**).

Plate 19. Existing fence condition looking east along the eastern revegetation area (January 2024, Year 7)

4.2.5 Weed infestation and pest species

Weed infestation within the revegetation area was low to moderate. There were eight species present including *Carthamus lanatus* (Saffron Thistle)*, Conyza bonariensis* (Fleabane)*, Sonchus oleraceus* (Common Sowthistle)*, Citrullus colocynthis* (Bitter Melon)*, Medicago laciniata var. laciniata* (Cutleaf Medic) and *Avena* sp. (Oat). A total of four new weed species were identified within the revegetation area monitoring plot including *Echium plantagineum* (Patterson's Curse), *Heliotropium supinum* (Heliotrope), *Lepidium africanum* (Lepidium) and *Solanum nigrum* (Blackberry Nightshade). *Carthamus lanatus* (Saffron Thistle) remains widespread in surrounding areas of the Nyngan Solar Plant. Management of these weeds needs to continue to achieve eradication.

One Red Fox (*Vulpes vulpes*) was observed within the fenced area of the regeneration site. In line with the management measures outlined in the BOMP (NGH Environmental, 2014), it is required to conduct baiting or trapping if cats, dogs or foxes are detected within the regeneration area (refer to **Table 5-1**). Where possible, coordinate baiting or trapping with adjacent landowners to maximise effects. Additionally, several European Hares were observed within the adjacent property to the south of the revegetation area and the Nyngan Solar Plant. Importantly, none were observed within the revegetation area.

4.2.6 Habitat evaluation

The revegetation area currently provides marginal quality habitat for the Grey-crowned Babbler (listed as Vulnerable under *NSW Biodiversity Conservation Act* 2016). As planted shrub species and overstorey Eucalypts grow, this may improve. The groundcover saw a marginal decline from the previous monitoring period (Year 6), though maintains above benchmark values, providing potential foraging habitat for the Grey-crowned Babbler. It is likely to take 5 -10 years before the overstorey is a suitable height for nesting habitat. The bare ground and emerging groundcover may provide some areas of open foraging habitat for birds. Five Grey-crowned Babbler birds were observed in the middle of the western revegetation area on the 29/09/2022 (during inspection by contractor).

4.3 Actions implemented since the Year 6 monitoring survey

Since the Year 6 monitoring survey, AGL has implemented weed management actions at the revegetation area (with engagement of Tikkara Pastoral Co). Spot spraying of weeds was conducted during September 2023. Non-native species targeted included Spiny Emex (Rumex spinosus), Smooth Mustard (Sisymbrium erysimoides), Common Heliotrope (Heliotropium europaeum), Saffron Thistle (Carthamus lanatus), Onion weed (Asphodelus fistulosus), Scotch thistle (Onopordum acanthium), and Paterson's curse (Echium plantagineum). The timing of management actions was adequate for control of most of the species targeted especially Saffron thistle, Spiny Emex and Smooth mustard as they had not yet set seed.

4.4 Recommended future management actions

The following management actions are recommended for the revegetation area within the Nyngan Solar Plant. These actions are also included in **Section 5** of this report.

- Replacement planting is recommended at a low rate (approximately 200 plants per revegetation area) and in clusters along the revegetation areas using the species of plants that were previously planted and have survived (see **Table 4-1**).
    - Supplementary planting is recommended to be undertaken when weather conditions are cooler (Autumn / Winter), preferably after average or higher monthly rainfall over several successive months. Intensive watering in of tubestock at the time of planting as well as subsequent watering following planting is required.
    - A suitably experienced contractor is required to advise on species and watering frequency.
    - Tree guards are required for all tubestock to protect plants against grazing and create a microclimate around the plant that assists in moisture retention and cooling. Carton guards are recommended over

plastic guards because of their ability to more readily breakdown if lost in the surrounding environment and their ease of installation. Intensive watering is required at the time of planting and follow up watering at a rate inversely proportional to rainfall until plants to become established.

- Further to supplementary planting, it is recommended that brush matting be used with the revegetation area to assist the natural regeneration of native vegetation.
- Collection of native seed is to be undertaken by a qualified Bush Regeneration contractor and placed within the site on branches scattered along and around the original planting rip lines.
- Branches should be left with seed in-situ, allowing seeds to disperse naturally and lay dormant within the groundlayer until favourable weather conditions activate germination. This process is to be undertaken after suitable withholding periods post targeted weed spraying.
- Targeted spot spraying of weeds is recommended in early spring 2024, to allow for continued improvement in the natural regeneration of the areas and greater growth in the surviving tubestock species.

Table 4-1. Recommended species for replacement planting at the revegetation area

Stratum	Suitable Species	Suggested planting density
Trees and tall shrubs	*Acacia excelsa* *Acacia melvillei* *Callitris glaucophylla* *Eremophila mitchellii* *Geijera parviflora* *Hakea tephrosperma* *Eucalyptus populnea* ssp. *bimbil*	Approximately 3m spacing in rows spaced a minimum of approximately 3m apart. Trees and tall shrubs would be alternated with shrubs and sub-shrubs.
Shrubs and sub-shrubs	*Dodonaea viscosa* subsp. *mucronata* *Eremophila longifolia* *Senna* form taxon *'zygophylla'*	

Note: The above species are a selection of the original planting list detailed in the 2013 Biodiversity Offset Management Plan by NGH Environmental. These species are usually tolerant of dry conditions and are likely to persist in the revegetation area or surrounding environment. Other species which were also planted in the revegetation area in 2017 such as Kurrajong (*Brachychiton populneus*), Deane's Wattle (*Acacia deanei*) and Old-man Saltbush (*Atriplex nummularia*) were found to have survived recent dry conditions and should be included in replanting if available.

In alignment with the NSW DCCEEW AEMR-4 recommendations (dated 19 March 2021), a fauna and weeds check(s) (separate to the annual monitoring survey) will be conducted during the year.

5. Management Actions

The management measures outlined in the BOMP (NGH Environmental, 2014) are listed in **Table 5-1** below. Additionally, **Table 5-1** provides an evaluation of the need for each management action, based on observation during the monitoring works, the timing, and who is required to undertake the action. Management actions relate to the Nyngan Offset Site (**Figure 2-2**) and the Nyngan Solar Plant revegetation area (**Figure 4-1**). The targets for completion of management actions, and trigger points for when management action may be required are also detailed in **Table 5-1**.

Table 5-1. Management Actions for the Nyngan offset site and Nyngan Solar Plant revegetation area

(Note: In the first five columns, the original BOMP text is black, while text added since the original BOMP is blue)

Management measure	Objective and performance criteria	Trigger point	Action	Timing	Actions undertaken by AGL	Target met this year?	Actions required in 2024	Adaptive measures / recommended actions for 2024 / Timing
Exclusion of livestock	To prevent overgrazing and encourage regeneration of native vegetation. Target is zero livestock within offset site and revegetation area.	Fence damage observation requires action.	Install stock proof fencing around the perimeter of the offset site. Maintain fencing.	At establishment of the offset site.	Fence installed around the offset site in 2018. Revegetation area is fenced off. Fence checked October 2022. Small section of damage fence on northern boundary was repaired in December 2022.	Yes	n/a	Fence check (mid 2024 preferable)

Management measure	Objective and performance criteria	Trigger point	Action	Timing	Actions undertaken by AGL	Target met this year?	Actions required in 2024	Adaptive measures / recommended actions for 2024 / Timing
		Detection of >1 sheep/cow/ goat requires action.	Inspections of offset site and revegetation areas. Remove stock if required.	Ongoing Removal following observation of stock.	Refer to **Section 4.3**.	Yes. No domestic livestock observed during January 2024 surveys.	No	Check for stock intrusion during 2024.
Weed control	To minimise the occurrence of weeds within the offset site particularly Weeds of National Significance (WoNS) and listed noxious weeds. Target is a decrease in percentage cover and species count of exotic species each monitoring period (however also influenced by rainfall).	Annual monitoring results to inform weed control requirements.	Survey to identify target locations for weed control. Weed control using appropriate methodologies considering target species and landscape context.	Ongoing as required.	No targeted weed spraying was conducted at the Nyngan Solar Plant offset site. Targeted weed spraying was conducted at the revegetation area in Sept 2023.	Yes, reduction in weeds during 2023.	Yes	Spot-spraying of re-emerging weeds in early spring 2024. (In growth season, in suitable low wind conditions to prevent spray drift reaching other native species).

Management measure	Objective and performance criteria	Trigger point	Action	Timing	Actions undertaken by AGL	Target met this year?	Actions required in 2024	Adaptive measures / recommended actions for 2024 / Timing
Exclusion of feral pigs and deer	To exclude feral pigs and deer. To improve natural regeneration of vegetation, prevent soil disturbance which may lead to erosion and to prevent potential harm to and competition with native fauna. Target is zero pigs / zero deer	Detection of one or more pigs / deer requires action.	Install and maintain preventative fencing suitable for the target species. Remove pigs and deer (by trapping or other means) if detected within the offset site.	Ongoing. Removal following observation of pigs or deer.	None.	No. Two wild pigs were identified within the offset site in February 2024 during monitoring surveys.	Yes	Pig trapping (or other means) to be undertaken in 2024 within the offset site and revegetation site. Continue to check for pest animals during 2024. Fence check and repair of any damage observed.
Feral Cat / wild dog / fox control	To minimise the presence of cats, wild dogs and foxes. To eliminate feral pests from within the site and improve opportunities for native fauna to inhabit the site. Target is zero foxes/ wild dogs / cats within offset site and revegetation area.	Detection of one or more cats / wild dogs / foxes requires action.	Monitor for presence of cats, dogs and foxes. Conduct baiting or trapping if cats, dogs or foxes are detected within the offset area. Where possible, coordinate baiting or trapping with adjacent landowners to maximise effects.	Ongoing. Removal following observation of exotic predators.	None.	No. One Red Fox was observed within the revegetation area in February 2024 during monitoring surveys.	Yes	Baiting or trapping to be undertaken in 2024 within the revegetation area. Continue to check for pest animals during 2024. Fence check and repair of any damage observed.

Management measure	Objective and performance criteria	Trigger point	Action	Timing	Actions undertaken by AGL	Target met this year?	Actions required in 2024	Adaptive measures / recommended actions for 2024 / Timing
Rabbit control	To minimise the risk of the Offset Site becoming a refuge for rabbits. To eliminate rabbits within the site and reduce grazing on native flora. Target is minimal rabbits (<10) within offset and revegetation areas.	Detection of >10 rabbits / hares (or a warren) requires action.	Monitor for presence of rabbits or warrens. Conduct baiting or controlled grazing to reduce the ability of the site to act as a refuge to rabbits. Where possible, coordinate baiting with adjacent landowners to maximise effects.	Consideration given to action on the basis of monitoring results.	None required at this stage. Re-evaluate during next monitoring event.	Yes	Not required at this stage.	Check for pest animals during 2024.
Monitoring	To determine the effectiveness of management measure.	n/a	Conduct monitoring as detailed in Section 5.3 of the BOMP. Adapt management measures where required.	Annually	n/a	Yes	Annual Monitoring.	n/a
Adapt measures to resident native fauna	To ensure that resident native fauna are not adversely impacted by management actions.	n/a	If resident native fauna may be impacted by management actions, adapt actions as required to address the risk of impact.	As required	n/a	n/a	n/a	n/a

Management measure	Objective and performance criteria	Trigger point	Action	Timing	Actions undertaken by AGL	Target met this year?	Actions required in 2024	Adaptive measures / recommended actions for 2024 / Timing
Additional Management Measures								
Control of Noisy Miners	To reduce Noisy Miners within the offset site to decrease competition with other native woodland birds.	n/a	None required at this stage.	Not required at this stage	n/a	n/a	n/a	n/a
Monitoring plot survey	Repeat monitoring plot surveys to evaluate the 'improve or maintain' outcome of biodiversity values at the site.	n/a	Repeat monitoring of all plots within the offset site.	Yes, annual monitoring required late 2024	This report.	Yes	Annual Monitoring.	Time the monitoring survey to capture weed control efforts where possible.
Monitoring of revegetation area	Repeat monitoring plot survey to evaluate the condition of revegetation areas with regards to planting survival rates and natural regeneration diversity and cover.	n/a	Repeat monitoring of single plot within the eastern revegetation area.	Yes, required late 2024	This report.	Yes	Annual Monitoring.	Time the monitoring survey to capture weed control efforts where possible.
Supplementary planting of revegetation area	To enhance the native vegetation, cover in the revegetation areas	None	Supplementary planting of approximately 200 plants per revegetation area,	Yes required, when the weather is warm but not hot and following several months of	During 2020-2021, AGL contacted numerous contractors to seek their interest and	No	Yes, if practicable.	Planting to be conducted in 2024 when weather conditions are suitable.

Management measure	Objective and performance criteria	Trigger point	Action	Timing	Actions undertaken by AGL	Target met this year?	Actions required in 2024	Adaptive measures / recommended actions for 2024 / Timing
Supplementary planting of revegetation area (cont.)	and replace plants lost.		using a mixture of *Eucalypt spp., Acacia spp.* and other hardy shrub species that were previously planted and have survived. Intensive watering in of tubestock at the time of planting as well as subsequent watering following planting is paramount. A qualified Bush Regeneration contractor is required to advise on watering frequency and as such a degree of flexibility should be allowed for in any quotation for these services.	average or higher rainfall. Subject to suitable weather conditions in the locality.	capability for the planting and watering work. However, the remote location of the Nyngan Solar Plant and lack of suitable contractors means there are significant challenges in getting this measure implemented, particularly the ongoing watering required to keep the plants alive.			
Brush-matting of revegetation area	To enhance the natural regeneration of the revegetation area.	None	Collection of native seed from local provenance placed within the revegetation area on branches	Yes, required in early spring 2024 after suitable withholding periods. Must be undertaken post	None.	No	Yes, if practicable.	Plan to undertake this action in 2024 if better conditions arise, subject to local seed availability.

Management measure	Objective and performance criteria	Trigger point	Action	Timing	Actions undertaken by AGL	Target met this year?	Actions required in 2024	Adaptive measures / recommended actions for 2024 / Timing
			scattered along the original planting rip lines. Branches should be left with seed in-situ, allowing seeds to disperse naturally and lay dormant within the groundlayer until favourable weather conditions activate germination.	targeted weed spraying.				
Fence modification	To prevent kangaroos and other native wildlife from being injured or killed by fences.	None	Monitoring should be undertaken to determine whether kangaroos and other animals continue to become entangled in fencing. Monitoring should also determine whether the modified fence continues to be effective in excluding large non-native herbivores.	Done	The perimeter fence has been modified to prevent entanglement.	Yes	Yes	Check the fencing during 2024.

Notes: If feral pigs are seen in the offset site, the recommended action in the first instance is trapping and use of firearm to kill any caught pigs. The specific process for the trapping procedure, killing of any caught pigs and disposal of carcasses are outlined on the NSW Department of Primary Industries (DPI) web page: https://www.dpi.nsw.gov.au/biosecurity/vertebrate-pests/pest-animals-in-nsw/feral-pigs/feral-pig-control. Central West Local Land Services have an office based at Nyngan and a trap readily available for loan to assist in this process. Liaison with the landowner to undertake this process is required.

6. Conclusions

As per the requirements of the MCoA for the Nyngan Solar Plant, the offset site is required to be monitored annually and the results reported to NSW DCCEEW. Condition C5(b) specifically states that the biodiversity outcome to be achieved must 'improve or maintain' the biodiversity values of the offset site. This report outlines the results of the seventh ecological monitoring survey for the offset site since the baseline study recorded in the BOMP by NGH Environmental (2014).

In addition, this report provides a condition assessment for the revegetation area at the Nyngan Solar Plant, which was required by the condition of approval (CoA B18, October 2011). The revegetation area was to provide both visual screening along the southern boundary of the Nyngan Solar Plant, as well as future compensatory habitat for the Grey-crowned Babbler in the immediate area where habitat has been removed and where the species is known to occur and breed.

6.1 Conditions at the offset site

The Year 7 monitoring results show maintained or improved conditions across the offset site with regards to native vegetation coverage and quality. Native vegetation was significantly impacted by drought in 2018 and 2019 and above average rainfall conditions between 2020 and 2022 had stimulated the growth of many plant species, which were not seen in Year 2 and 3 monitoring surveys. The climatic conditions in 2023 saw a slight reduction in rainfall in western NSW, however, despite this, there has been further ecological succession in both vegetation communities in the offset site this year.

The condition of the Open White Cypress Pine Woodland community has remained stable during the last year, with improvements to native species richness and shrub cover, where native forb species and overstorey and mid-storey have generally been maintained since the previous year. A reduction in native grass cover was most evident in this community, due to a reduction in annual rainfall. The dominant native species observed within this community include Panicum effusum (Hairy Panic), *Austrostipa scabra subsp. scabra* (Speargrass), *Xerochrysum viscosum* (Sticky Everlasting), *Paspalidium constrictum* (Box Grass) and *Enteropogon acicularis* (Curly Windmill Grass). With a predicted future decline in annual rainfall, it is likely that a further growth in chenopod species may eventuate. The increased regeneration of overstorey species in M02, such as White Cypress Pine, is further evident since last year (Year 6) and likely to continue over time. M01 showed a slight decrease in overstorey species, though mid-storey species were seen to have increased in cover since last year (Year 6). White Cypress Pines appear to be regenerating well across the offset site, with many new trees now exceeding one metre in height.

Overall, the White Cypress Pine – Poplar Box Woodland community is in moderate condition and has overall maintained last year's values. The community continues to exceed a number of the benchmarks and baseline values (NGH Environmental, 2014), pertaining to species richness, native grasses, native groundcover (forbs) and, in M04, overstorey cover. Grass cover was marginally less than last year (Year 6), though remains substantially higher than previous years and well above the benchmark range and baseline levels. This is largely due to the recent abundance of native *Paspalidium constrictum* (Box Grass) and *Panicum effusum* (Hairy Panic) grass, likely responding to consecutive years of higher rainfall. Groundcover shrub has slightly decreased in M03, as a result of competition with native grasses, where M04 has displayed an increase, both plots continuing to remain within the benchmark range for the community. Health of existing Eucalypt and Cypress Pine trees is good, with some areas containing regeneration, particularly of Cypress Pine. Recruitment of Eucalypt species remains low in these areas and may require more years of favourable weather conditions to allow for higher seed dispersal and germination.

Importantly, the monitoring plots are generally within or exceeding the benchmark and baseline values, in addition to receiving ongoing management. Future fluctuations in vegetation quality are anticipated to primarily stem from seasonal changes, resulting in periodic fluctuations in vegetation quality, rather than experiencing ongoing exponential growth.

Stock proof fencing around the offset site has been present since early 2018 and it is likely that with the fencing in place, the biodiversity values of the offset site will improve through the exclusion of some feral pests and other herbivores, allowing further opportunities for natural regeneration to occur once suitable rainfall conditions persist. The fence is in good condition around the perimeter of the offset site although two wild pigs were observed within the offset site. Ongoing inspections and management actions need to be taken to prevent herbivores from accessing the site in the future. Kangaroos were present this year. During recent years, Kangaroo numbers appear to be low, and overgrazing is currently not a concern.

Fauna habitats across the offset site are in moderate to good condition and have been maintained, with adequate grass and groundcover habitat due to recent wetter conditions. Grey-crowned Babblers (Vulnerable under *NSW Biodiversity Conservation Act* 2016) were observed calling within the offset site along the western woodland area.

Overall weed infestation across the offset site was low and targeted herbicide treatment in 2021 and 2022 appears to have been effective (particularly against Saffron thistle). Weed coverage has decreased by approximately 6% this year, likely due to weed management and a reduction in annual rainfall. None of the weeds identified within the site are declared as state or regional priority weeds under the *Biosecurity Act 2015* or the *Western Regional Strategic Weed Management Plan 2023-2027* (LLS, 2022). Importantly, management of weeds needs to continue to achieve eradication.

6.2 Conditions at the Nyngan Solar Plant revegetation area

Overall, the Nyngan Solar Plant revegetation area has maintained a similar plant survival rate since last year and condition of surviving plants has improved due to the previous years' above average rainfall. Most original plantings appear to have put on a further significant foliage growth in the past 12 months, with some regeneration occurring. This year, the total overall native vegetation cover for the revegetation area is slightly lower than the previous year, though with a marginal growth in native groundcover-other (forbs). Native grass cover continues to dominate the groundcover, resulting in above benchmark values, though saw a slight decline since the previous year. Likely due to less competition with native grasses, native forb species have increased in cover, resulting in a higher species richness since the previous year. Additionally, two new native grass species were recorded this year within the revegetation area including *Eragrostis sp.* and *Sporobolus caroli.* At the time of writing, favourable weather conditions are beginning to decelerate, and the proposed planting of more tubestock (to account for losses during 2018/2019) should be conducted when weather conditions are suitable.

Weed infestation within the revegetation area was low to moderate and targeted herbicide treatment in September 2023 appears to have been effective.

One Red Fox (*Vulpes vulpes*) was observed within the fenced area of the regeneration site. In line with the management measures outlined in the BOMP (NGH Environmental, 2014), it is required to conduct baiting or trapping if cats, dogs or foxes are detected within the regeneration area.

Five Grey-crowned Babbler (Vulnerable under *NSW Biodiversity Conservation Act* 2016) birds were reportedly observed in the middle of the western revegetation area on the 29/09/2022 (during inspection by contractor). However, none were observed within or near the revegetation area during the surveys for this monitoring report (January 2024). The revegetation area currently provides marginal quality habitat for this target species. As the planted shrub species and overstorey Eucalypts grow, habitat values may improve, however it is likely to take 5 to 10 years before the planted trees reach suitable height and density. Gaps between tree patches will also require replanting to maintain linear corridors.

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Appendix A. Flora species list and opportunistic fauna list

Table A-1. Flora species list and 20m x 20m plot survey Modified Braun Blanquet scores

Family	Genus	Species	N or E	M01	M02	M03	M04	Reveg area	Previously recorded
Asteraceae	*Carthamus*	*lanatus**	E					1	x
Asteraceae	*Conyza*	*bonariensis**	E				3	1	x
Asteraceae	*Lactuca*	*serriola f. serriola**	E				1	1	x
Asteraceae	*Sonchus*	*oleraceus**	E				1	1	x
Cucurbitaceae	*Citrullus*	*colocynthis**	E						x
Fabaceae - Faboideae	*Medicago*	*laciniata var. laciniata**	E						x
Poaceae	*Avena*	*sp.**	E		1				x
Polygonaceae	*Emex*	*australis**	E						x
Verbenaceae	*Glandularia*	*aristigera**	E						
Acanthaceae	*Brunoniella*	*australis*	N		1	3	2		x
Acanthaceae	*Rostellularia*	*adscendens var. adscendens*	N			1	1		x
Amaranthaceae	*Alternanthera*	*sp. A Flora of New South (M.Gray 5187)*	N						x
Amaranthaceae	*Ptilotus*	*obovatus*	N	1		2	1		x
Amaranthaceae	*Ptilotus*	*polystachyus*	N			2		1	x
Apocynaceae	*Marsdenia*	*australis*	N				1	1	x
Apocynaceae	*Parsonsia*	*eucalyptophylla*	N						x
Apocynaceae	*Rhyncharrhena*	*linearis*	N	1					x
Asteraceae	*Calotis*	*cuneifolia*	N						x
Asteraceae	*Calotis*	*lappulacea*	N	3	3	1	2	2	x
Asteraceae	*Chrysocephalum*	*apiculatum*	N	3	2				x
Asteraceae	*Euchiton*	*sphaericus*	N	1			2		x
Asteraceae	*Glossocardia*	*bidens*	N						x
Asteraceae	*Rhodanthe*	*floribunda*	N	3	2	2			x
Asteraceae	*Stuartina*	*muelleri*	N						x
Asteraceae	*Vittadinia*	*dissecta var. hirta*	N	2					x
Asteraceae	*Vittadinia*	*cuneata var. cuneata*	N	2	1	2			x
Asteraceae	*Vittadinia*	*sulcata*	N		1	2	1	3	x
Asteraceae	*Vittadinia*	*gracilis*	N	2					x
Asteraceae	*Xerochrysum*	*viscosum*	N	2	2	1	1	1	x
Boraginaceae	*Echium*	*lycopsis**	E						
Boraginaceae	*Echium*	*plantagineum**	E					1	

Family	Genus	Species	N or E	M01	M02	M03	M04	Reveg area	Previously recorded
Boraginaceae	*Heliotropium*	*europaeum****	E						x
Boraginaceae	*Heliotropium*	*supinum**	E					1	
Brassicaceae	*Lepidium*	*africanum**	E					2	
Campanulaceae	*Wahlenbergia*	*sp.*	N						x
Campanulaceae	*Wahlenbergia*	*gracilis*	N	1	2	1	1	2	x
Chenopodiaceae	*Atriplex*	*sp.*	N			1			x
Chenopodiaceae	*Chenopodium*	*desertorum*	N				1	2	x
Chenopodiaceae	*Dysphania*	*pumilio*	N					2	x
Chenopodiaceae	*Einadia*	*nutans subsp. nutans*	N	2			2		x
Chenopodiaceae	*Einadia*	*nutans subsp. linifolia*	N			4	4	2	x
Chenopodiaceae	*Enchylaena*	*tomentosa*	N	1		3	3		x
Chenopodiaceae	*Maireana*	*villosa*	N		1				x
Chenopodiaceae	*Maireana*	*microphylla*	N						x
Chenopodiaceae	*Maireana*	*enchylaenoides*	N						x
Chenopodiaceae	*Rhagodia*	*spinescens*	N				1		x
Chenopodiaceae	*Salsola*	*australis*	N						x
Chenopodiaceae	*Sclerolaena*	*birchii*	N				2	3	x
Chenopodiaceae	*Sclerolaena*	*bicornis var. bicornis*	N		1		3		x
Chenopodiaceae	*Sclerolaena*	*sp.*	N						x
Convolvulaceae	*Convolvulus*	*recurvatus subsp. recurvatus*	N			1		1	x
Cupressaceae	*Callitris*	*glaucophylla*	N	3	3	4	3		x
Euphorbiaceae	*Euphorbia*	*drummondii*	N	1				1	x
Fabaceae - Mimosoideae	*Acacia*	*deanei subsp. deanei*	N					3	x
Geraniaceae	*Erodium*	*crinitum*	N						x
Goodeniaceae	*Goodenia*	*cycloptera*	N	2	1	1			x
Lamiaceae	*Teucrium*	*racemosum*	N						x
Lomandraceae	*Lomandra*	*effusa*	N						x
Malvaceae	*Abutilon*	*oxycarpum*	N					1	x
Malvaceae	*Abutilon*	*halophilum*	N			2		1	x
Malvaceae	*Brachychiton*	*populneus subsp. trilobus*	N						x
Malvaceae	*Sida*	*cunninghamii*	N	2	2	2	2	3	x
Malvaceae	*Sida*	*corrugata*	N		1	1	1		x

Family	Genus	Species	N or E	M01	M02	M03	M04	Reveg area	Previously recorded
Myrtaceae	*Eucalyptus*	*populnea subsp. bimbil*	N	2		2	3		x
Nyctaginaceae	*Boerhavia*	*dominii*	N	1					x
Oxalidaceae	*Oxalis*	*perennans*	N	2	1	1		1	x
Poaceae	*Aristida*	*jerichoensis var. subspinulifera*	N	3	3				x
Poaceae	*Austrostipa*	*scabra subsp. scabra*	N	3	2	3	3	1	x
Poaceae	*Dichanthium*	*sericeum*	N						x
Poaceae	*Digitaria*	*brownii*	N						x
Poaceae	*Digitaria*	*divaricatissima*	N					2	x
Poaceae	*Enneapogon*	*avenaceus*	N					3	x
Poaceae	*Enteropogon*	*acicularis*	N	2			1	3	x
Poaceae	*Eragrostis*	*Sp.*	N					2	
Poaceae	*Panicum*	*decompositum*	N		3		1		x
Poaceae	*Panicum*	*effusum*	N	3	4	3	1	3	x
Poaceae	*Paspalidium*	*constrictum*	N		2	4	4	4	x
Poaceae	*Sporobolus*	*caroli*	N					1	
Poaceae	*Sporobolus*	*contiguus*	N						x
Poaceae	*Thyridolepis*	*mitchelliana*	N	2		1			x
Poaceae	*Tragus*	*australianus*	N	3		1			x
Polygonaceae	*Rumex*	*hypogaeus**	E				1		x
Portulacaceae	*Portulaca*	*oleracea*	N					1	x
Proteaceae	*Hakea*	*tephrosperma*	N	2					x
Pteridaceae	*Cheilanthes*	*sieberi subsp. sieberi*	N	2	3				x
Rutaceae	*Geijera*	*parviflora*	N			1			x
Sapindaceae	*Dodonaea*	*viscosa subsp. mucronata*	N			1	1		x
Scrophulariaceae	*Eremophila*	*longifolia*	N	3	1		1		x
Scrophulariaceae	*Eremophila*	*mitchellii*	N						x
Solanaceae	*Solanum*	*ellipticum*	N						x
Solanaceae	*Solanum*	*eremophilum*	N		2			2	x
Solanaceae	*Solanum*	*esuriale*	N	1	1	2	1	1	x
Solanaceae	*Solanum*	*nigrum****	E					1	
Zygophyllaceae	*Tribulus*	*micrococcus*	N					1	x
Zygophyllaceae	*Tribulus*	*minutus*	N						x

Key: N = Native, E = Exotic

General weed, **State and Regional weeds to be targeted (Biosecurity Act 2015), * Additional species of concern (Biosecurity Act 2015).*

Table A-2. Opportunistic fauna species list

Class	Species	Common Name	Sighting
Birds	*Artamus leucorynchus*	White-breasted Woodswallow	Observed in the revegetation area
	Corvus coronoides	Australian Raven	Observed in the offset site
	Cracticus tibicen	Australian Magpie	Observed in the revegetation area
	Eolophus roseicapilla	Galah	Observed in the offset and revegetation areas
	Grallina cyanoleuca	Magpie Lark	Observed in the offset and revegetation areas
	Hirundo neoxena	Welcome Swallow	Observed in the revegetation area
	Malurus cyaneus	Superb Fairywren	Observed in the offset site
	Malurus leucopterus	White-winged Fairywren	Observed in the revegetation area
	Manorina melanocephala	Noisy Miner	Observed in the offset site
	Milvus migrans	Black Kite	Observed flying over the revegetation area
	Ocyphaps lophotes	Crested Pigeon	Observed in the revegetation area
	*Pomatostomus temporalis**	Grey-crowned Babbler	Observed calling within the offset site
	Psephotus haemotonotus	Red-rumped Parrot	Observed in the revegetation area
	Rhipidura leucophrys	Willie Wagtail	Observed in the revegetation area
	Struthidea cinerea	Apostlebird	Observed in the offset site
Mammals	*Macropus giganteus*	Eastern Grey Kangaroo	Observed outside of fenced revegetation area
	Macropus rufus	Red Kangaroo	Observed in the offset site
	*Lepus europaeus***	European Hare	Observed outside of fenced revegetation area
	*Sus scrofa***	Wild Pig	Observed in the offset site
	*Vulpes vulpes***	Red Fox	Observed in the revegetation area
Reptiles	*Varanus gouldii*	Sand Goanna	Observed in the offset site

**Denotes a threatened species listed under the NSW Biodiversity Conservation Act 2016*

***Denotes an introduced species*

Appendix B. Condition of Approval (COA) C5

Biodiversity Offset Management Plan

C5. Following final design and prior to the commencement of construction, or as otherwise agreed to by the Director-General, the Proponent shall develop and submit a Biodiversity Offset Management Package for the approval of the Director-General. The package shall detail how the ecological values lost as a result of the Project will be offset. The Biodiversity Offset Management Package shall be developed in consultation with the OEH and shall (unless otherwise agreed by the Director-General) include, but not necessarily be limited to:

(a) an assessment of all native vegetation communities, threatened species habitat and Willyama Common land that will either be directly or indirectly impacted by the proposal;

(b) the objectives and biodiversity outcomes to be achieved (including 'improve or maintain' biodiversity values), and the adequacy of the proposed offset considered;

(c) the final suite of the biodiversity offset measures selected and secured including but not necessarily limited to;

  i) an offset proposal which is supported by a suitable metric method (such as the Biobanking Assessment Methodology);

  ii) details of the relative condition and values of communities on the offset site in comparison to those to be impacted, including all areas of native shrubland in moderate to good condition;

  iii) proposed management actions and expected gains;

(d) the monitoring requirements for compensatory habitat works and other biodiversity offset measures proposed to ensure the outcomes of the package are achieved, including:

  i) the monitoring of the condition of species and ecological communities at offset locations;

  ii) the methodology for the monitoring program(s), including the number and location of offset monitoring sites, and the sampling frequency at these sites;

  iii) provisions for the annual reporting of the monitoring results for a set period of time as determined in consultation with the OEH; and

(e) timing and responsibilities for the implementation of the provisions of the Package.

Land offsets shall be consistent with the *Principles for the use of Biodiversity Offsets in NSW* (NSW Office of Environment and Heritage, June 2011). Any land offset shall be enduring and be secured by a conservation mechanism which protects and manages the land in perpetuity. Where land offsets cannot solely achieve compensation for the loss of habitat, additional measures shall be provided to collectively deliver an improved or maintained biodiversity outcome for the region.

Where monitoring referred to in condition (d) indicates that biodiversity outcomes are not being achieved, remedial actions shall be undertaken to ensure that the objectives of the Biodiversity Offset Package are achieved.

Within one from approval from the Director-General the Proponent shall, in conjunction with the lessee of Western Lands Lease 14240, apply to the Crown Lands Division of the Department of Trade and Investment for a Change of Lease Purpose of Western Land Lease 14240 to appropriately record the biodiversity offset on title and within the lease conditions as a conservation area.