Broken Hill Solar Plant
Biodiversity Offset Site

PARF Company 6 Pty Limited

Annual Ecological Monitoring Report

Year 2 – 2018/19

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Broken Hill Solar Plant Biodiversity Offset Site Ecological Monitoring

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Executive Summary

As per the requirements of the Conditions of Approval (COA) the Broken Hill biodiversity offset site is required to be monitored and the results reported annually to the NSW Office of Environment and Heritage (OEH). Condition C5(b) specifically states that the biodiversity outcome to be achieved must 'improve or maintain' the biodiversity values of the site. This report outlines the results of the second monitoring survey for the offset site since the baseline study recorded in the Biodiversity Offset Management Plan (BOMP) by NGH (2013).

Overall the recent monitoring results demonstrate that biodiversity values across the site have declined with regards to floristic diversity, coverage and quality when compared to the vegetation community benchmarks (DECC 2008), baseline survey results recorded by NGH (2013) and 2017 surveys. Prolonged periods of dryness have inhibited the growth of many plant species and a number of species were not able to be identified. It is likely that seed stock lay dormant within the ground. The decline in condition is likely to be caused by ongoing drought conditions. A return to average or higher rainfall conditions would likely allow for the recovery of the vegetation.

The management actions proposed will further assist the natural regeneration once rainfall conditions suitable for plant growth return.

Stock proof fencing around the offset site has quite recently been installed and as such is in near new condition. It is likely that with the fencing in place the biodiversity values of the site will continue improve through the exclusion of feral goats and any livestock, allowing further opportunities for natural regeneration to occur when rainfall conditions permit.

Fauna habitats across the site are somewhat diverse and include; bare ground, chenopods, rocky patches, tussock grasses and some taller shrubs. These habitats have been maintained, with the exception of the groundcover. These habitats may improve with the installation of fencing and consequent exclusion of grazing from feral goats and a return to near average or greater rainfall. With the fences in place no further feral pest management is recommended until after a re-evaluation of vegetation condition and fauna habitats during the next monitoring event.

Weed infestations across the site are generally low and can be maintained by spot treatment as outlined in the management actions. Weeds of particular concern include the state and regional priority weeds (LLS 2017) Velvet Mesquite and African Boxthorn, which are required to be eradicated from the site so as to prevent further spread to surrounding lands. Peppercorn Tree infestations within the centre of the site provide habitat for a variety of birds, including babbler species. There are numerous active babbler nests throughout these trees and as such complete removal is not recommended. Control of emerging saplings, selective thinning of those trees not containing nests and replacement planting would allow for the infestation to be gradually reduced while maintaining fauna habitat.

It is recommended that future monitoring continue after a return to average rainfall conditions to provide a more meaningful comparison with these and previous results.

1. Introduction

1.1 Background and study area

In 2014, AGL Energy Limited (AGL) constructed a solar photovoltaic (PV) plant with a nominal capacity of 50 MW at Broken Hill in western NSW as part of the Commonwealth Solar Flagships Program. The solar plant is located on a property to the west of the Broken Hill township. The site is located at Lot 6806 DP 823918 and is approximately 200 hectares (ha) in area with additional areas of land for linear easements for the connection of the project's electrical infrastructure to the electrical grid and for road access from the Barrier Highway. The location of the solar plant, access and transmission easements and offset site are shown in (Figure 1-1).

The project was approved by the Department of Planning and Infrastructure (DP&I) on the 27 March 2013. It is a condition of approval (COA) that an Offset Management Package be developed to offset the ecological values lost as a result of the project (COA C5 detailed in Appendix B).

AGL engaged the existing lessee of the solar plant site to include a suitable area of land for offsetting within the scope of the project. Ownership of the plant and associated biodiversity offset was transferred from AGL PV Solar Developments Pty to PARF Company 6 Pty Limited as trustee of the Project Trust and PARF Company 4 Pty Limited as trustee of the Subhold Trust in November 2016. AGL Hydro Partnership are responsible for the ongoing operation of the plant and maintenance of the offset site, with First Solar (Australia) Pty Ltd providing maintenance services for the first five years of the plant's commercial operation.

The offset site is located 1.5 km west of the solar plant site, comprising the western portion of the same lot, Lot 6806 DP 823918, covering approximately 162 ha (refer Figure 1-1).

1.2 Objectives

This report documents the results of the second annual ecological monitoring event for the Broken Hill Offset site as required under Condition of Approval (COA) C5. Monitoring of the offset site is required to demonstrate an 'improve or maintain' outcome for the identified biodiversity offset values at the site and to identify any management/remedial actions required to achieve these outcomes.

Monitoring requires the collection of ecological data, consistent with the methodology described in the Biodiversity Offset Management Plan (BOMP) prepared by NGH Environmental (2013). The results are described and analysed with comparison to the baseline data from the BOMP (NGH 2013) and those of the first annual monitoring event to determine if there have been any significant changes in the vegetation and habitat conditions and the consistency of these with the objective of improving or maintaining the biodiversity values on the site.

In addition, an evaluation was undertaken of any required management actions and their effectiveness, as outlined in the BOMP (NGH 2013). The BioBanking Assessment Methodology (BBAM 2009) also lists the standard management actions required to be undertaken at offset sites. These are:

- 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
- Retention of rocks.

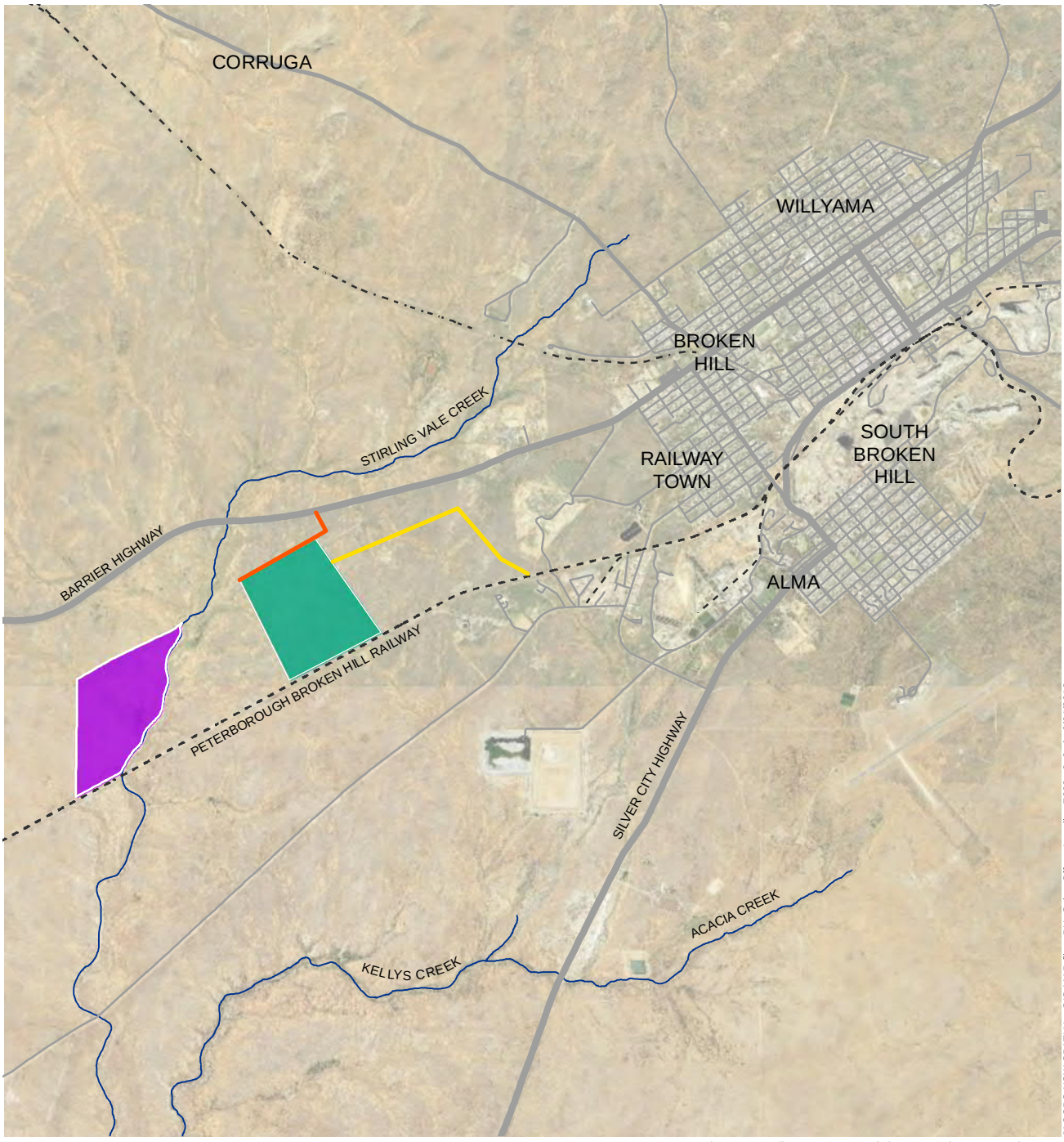


Figure 1.1 Broken Hill Solar Plant and offset site location

2. Monitoring method

2.1 Requirements

This chapter outlines the methodology used to undertake ecological monitoring at the Broken Hill offset site. Monitoring is consistent with the methodologies outlined in the BOMP (NGH 2013) and meets the requirements of the COA C5, outlined in Appendix B. In particular, 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 Broken Hill offset site have been evaluated through the comparison of monitoring data against the benchmark data, baseline data and the results of the first monitoring event for each surveyed vegetation community as well as the evaluation of weed infestation and fauna habitat. An overview of the monitoring methods used include:

- Vegetation condition assessment. Following the methodology used in the BOMP (NGH 2013), assessment was undertaken using the BioBanking Assessment Methodology (DECC 2009) to collect data on vegetation structure, cover and quality across transects and within plots. This data was then compared with the NGH (2013) baseline data where available and the benchmark data for each vegetation community type using the Vegetation Benchmarks Database (DECC 2008).

- Habitat evaluation. Notes on fauna habitat were taken across the broader site while traversing the site to reach the monitoring plots. At each monitoring plot detailed notes were taken.

- Fencing evaluation. Fences were assessed through observation by driving and walking around the perimeter of the site, looking for any areas requiring maintenance.

2.2 Field survey

Field survey was undertaken by two Jacobs Ecologists, Paul Rossington and Tim Maher, on the 14th of January 2019 across the five vegetation types identified within the offset site (listed in Table 2.1 below and shown on Figure 2.2) by NGH (2013).

Table 2.1 Vegetation types within the offset site

Vegetation Type (DECC 2008)	PCT ID	Area in offset site (ha)	Monitoring plots sampled by NGH (2013)	Monitoring sampled by Jacobs (2017 and 2018/19)	BBAM (DECC 2009) No. of plots required (see Table 2.2)	Threat category (Benson, 2006)*
Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	221	141.8	M03 (1 plot)	M03 & M07 (2 plots)	4-6 plots	Near threatened
Prickly Wattle open shrubland of drainage lines on stony rises and plains of the arid climate zone	136	8.5	M01 (1 plot)	M01 (1 plot)	2-3 plots	Least concern
Narrow-leaved Hopbush - Scrub Turpentine - Senna shrubland of semi-arid and arid sandplains and dunes	143	1.9	M04 (1 plot)	M04 (1 plot)	1 plot	Least concern
Mulga - Dead Finish on stony hills mainly of the Channel Country and Broken Hill Complex Bioregions	123	1.5	M02 (1 plot)	M02 (1 plot)	1 plot	Near threatened

Vegetation Type (DECC 2008)	PCT ID	Area in offset site (ha)	Monitoring plots sampled by NGH (2013)	Monitoring sampled by Jacobs (2017 and 2018/19)	BBAM (DECC 2009) No. of plots required (see Table 2.2)	Threat category (Benson, 2006)*
Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)	159	3.2	Not surveyed by NGH (2013)	M05 & M06 (2 plots)	2 plots	Critically Endangered*

*** This category is according to Benson (2006); none of these communities are listed under State or Commonwealth legislation**

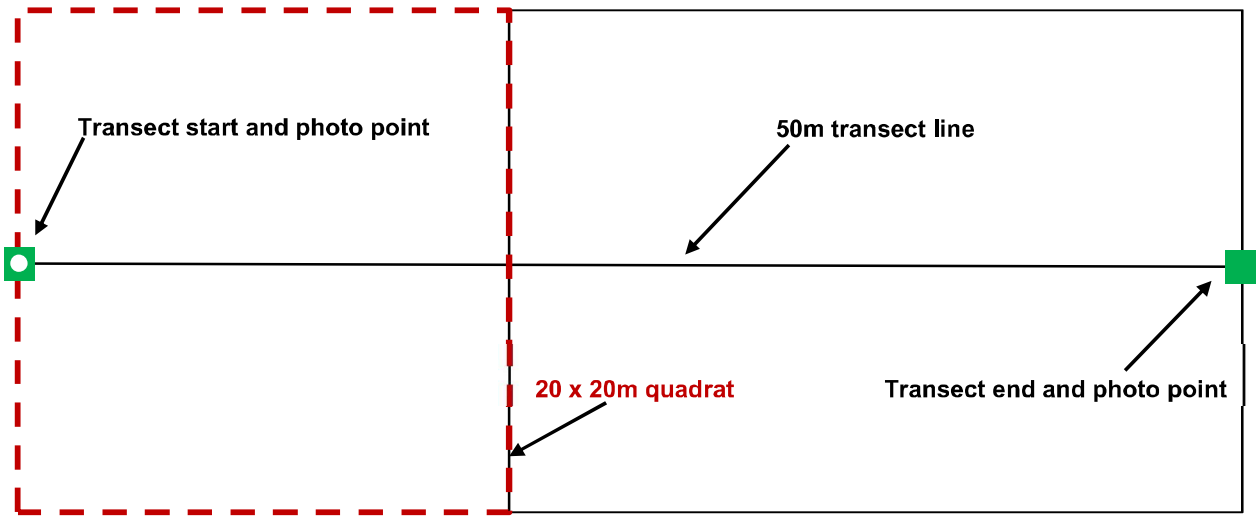
2.2.1 Vegetation condition assessment and establishment of monitoring plots

BioBanking plots were to be surveyed according to the BioBanking Assessment Methodology (BBAM) (DECC 2009), as outlined in COA C5 (Appendix B) and in the BOMP (NGH 2013). Baseline surveys undertaken by NGH (2013) set up just one monitoring plot per vegetation community. Jacobs has replicated their approach and added three new plots to be more consistent with the BBAM (DECC 2009), see Table 2.1.

Floristic data was collected to enable comparison between baseline data and benchmarks recorded in the BOMP (NGH 2013). The four monitoring plots established by NGH (2013), were located at the site using recorded GPS coordinates. These plots were previously marked in the field using wooden stakes driven into the ground to facilitate future replication. Stakes were placed at the start and end of a 50 metre transect and their coordinates recorded. Start points were delineated with a silver pin hammered into the top of the stake. A 20 x 20 metre 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 the diagram below. Where required, stakes that had deteriorated in the field over time were replaced with new, thicker stakes and pins. Photographs were taken at the start and end of each monitoring plot.

Three additional plots were also established using the same technique as above, two in the Old Man Saltbush vegetation type, which previously had not been surveyed and one in the Black Bluebush vegetation type, which occupies the largest area in the offset site.

All vegetation types and monitoring plots are shown in Figure 2.2.



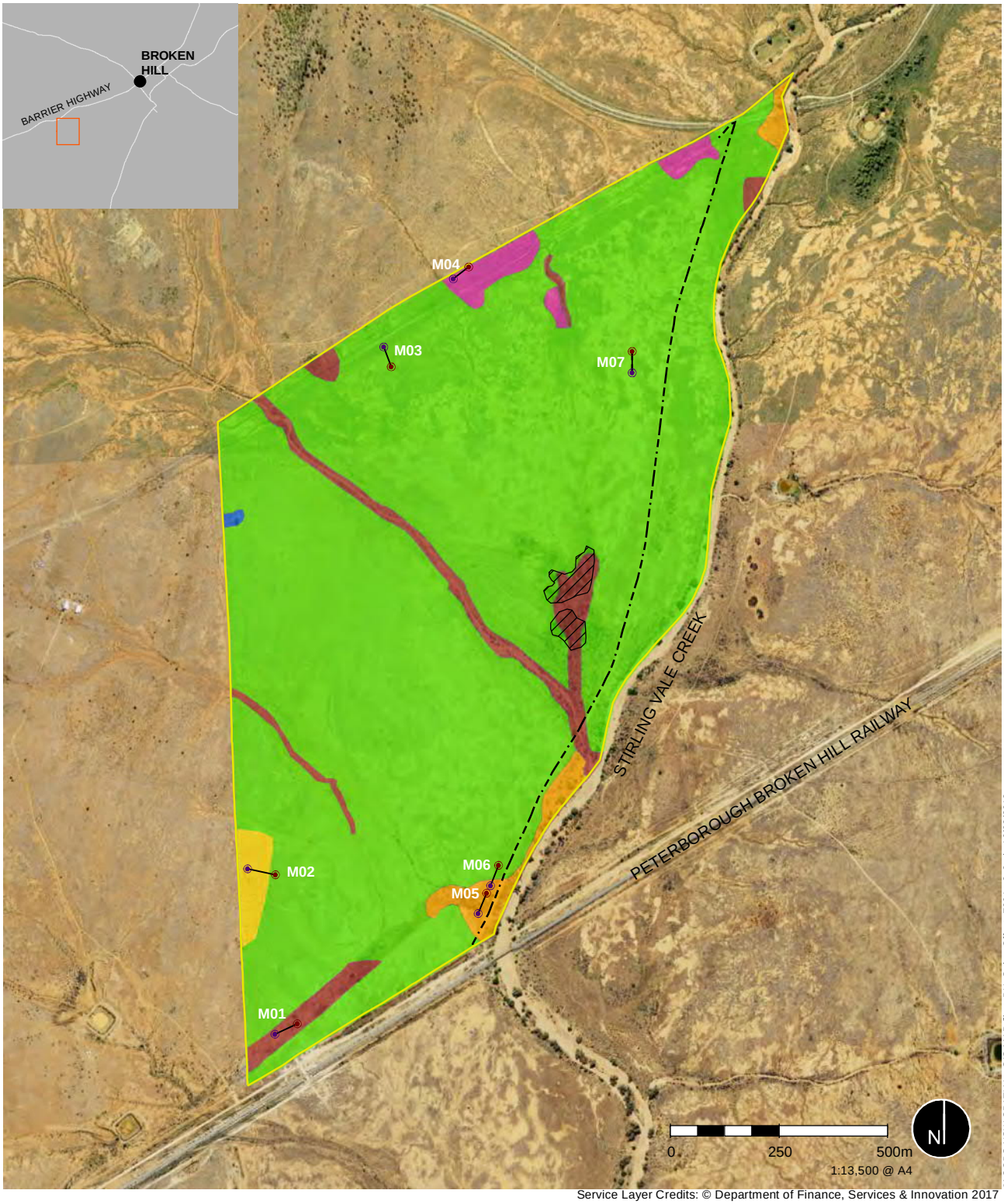


Figure 2.2 Vegetation types and monitoring plots within the Broken Hill Offset Site

2.2.2 Habitat evaluation

Detailed habitat notes were taken at each of the monitoring plot locations and included the percentage cover of the following habitat features within the entire 50 x 20 metre plot:

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

2.3 Limitations

2.3.1 Survey timing

Surveys were planned to be undertaken in late spring as per the recommendations in the BOMP (NGH 2013) to optimise the opportunity of identifying many spring and summer flowering species which are difficult to identify in their vegetative state. Due to prevailing drought conditions, with rainfall well below average during autumn and winter and early spring, the timing of the survey was delayed beyond the planned spring timing in an attempt to undertake the monitoring after rainfall, in conditions more equivalent to those of the previous surveys.

2.3.2 Climatic conditions

Broken Hill is a typically dry, semi-arid area that experiences low rainfall. While above average rainfall occurred in October and November it appears that rainfall was insufficient to trigger substantial plant growth. Prolonged dry weather preceding the survey had caused many plants to die making them difficult to identify and it is likely that there are multiple species present in the seed bank that were not evident during the survey.

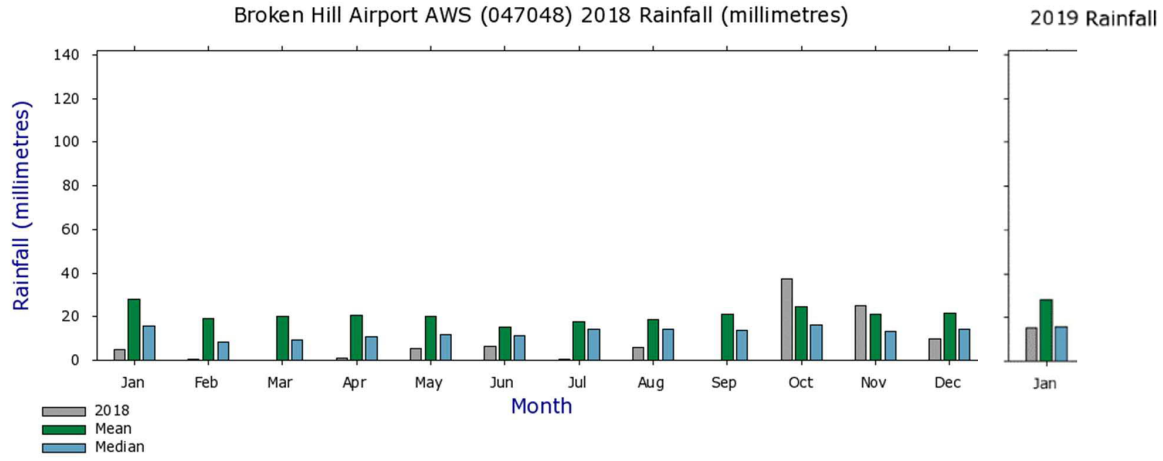


Table 2.2 Rainfall in Broken Hill preceding the surveys (source: Australian Bureau of Meteorology)

2.3.3 Grazing pressure

Kangaroos were observed to be common within the site and the scats of rabbits were observed. The combination of grazing and drought conditions made the detection and identification of plants difficult.

2.3.4 Data analysis

Floristic and habitat data collected within each monitoring plot were compared with the benchmark data (DECC 2008), baseline data collected by NGH (2013) and the results of the first monitoring survey. The results of these comparisons, along with the habitat data collected for each plot were evaluated to determine whether an 'improve or maintain' outcome is being achieved at the site.

Data collected during each monitoring year has been collated into one electronic database using Microsoft Excel, along with NGH (2013) baseline data and the benchmark data for each vegetation community so as to enable future analysis of data. Baseline data collected by NGH (2013) at the Broken Hill offset site was limited to a simple presence absence record of plants within monitoring plots. As such, this does not allow for a more detailed analysis to be undertaken to compare data. Jacobs has used the Modified Braun Blanquet method (see Table 2.3) for recording floristic abundance data within each monitoring plot, which allowed for more detailed analysis.

Table 2.3 Modified Braun Blanquet

Modified Braun Blanquet	
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

3. Monitoring results

3.1 Plot data descriptions and benchmark comparisons

The data and description of the results for each surveyed vegetation community are listed below. The coordinates for each monitoring plot are provided in Table 3.1 to enable repeat and consistent monitoring in the future. Photographs taken at the start and end of each monitoring plot are also provided.

Table 3.1 : Coordinates for each of the monitoring plots

Plot Name	Transect start		Transect end	
	Easting*	Northing*	Easting*	Northing*
M01	533641.52	6458408.77	533693.98	6458429.85
M02	533599.64	6458791.57	533663.43	6458774.15
M03	533978.53	6459970.07	533992.65	6459922.92
M04	534146.70	6460116.23	534183.12	6460141.86
M05	534122.66	6458659.4	534144.39	6458705.5
M06	534154.88	6458721	534175.37	6458766.9
M07	534543.53	6459880.4	534546.53	6459929.4

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

3.1.1 Black Bluebush low open shrubland

This community is the dominant vegetation type within the offset site. It is dominated by Black Bluebush (*Maireana pyramidata*) with other chenopod shrubs as sub-dominants including Crown Fissure-weed (*M. coronata*), Saltbushes (*Atriplex* spp.) and Copperburrs (*Sclerolaena* spp.). At the time of survey grasses were very sparse although it is likely that there would be a range of species evident in more favourable conditions (See Plates 1-4).

Weed species were not extensive in this community, *Medicago sp.* being frequently identified, though this species was only evident from old fruiting bodies and is probably only a significant feature of the vegetation after prolonged average or higher than average rainfall. The monitoring plot data along with the benchmarks for this vegetation type (DECC 2008) are shown in Table 3.2 and Table 3.3. Species richness (the number of native species, shown in the table below as 'Native Spp. #') was below the benchmark for this variable and lower than that recorded in the baseline and 2017 surveys. No overstorey or midstorey cover was recorded as the tallest shrubs were all below one metre. Shrub cover was substantially lower than during the baseline and 2017 surveys but still within the benchmark range for the plant community.

The other native groundcovers (excluding grasses) category was of very low cover (<1%) in the 2018/19 survey and well below benchmark condition. This result is much lower than in that of the 2017 survey but similar to that of the baseline, suggesting that this component of the vegetation is the most responsive to prevailing climatic conditions.

Grasses in both two plots were well below the benchmark range and significantly reduced in comparison to the NGH (2013) baseline survey and 2017 survey. Hollow Bearing Tree (HBTs) and logs were absent from this community. Overall this community is considered to be in moderate condition exhibiting reduced native vegetation cover since the baseline (NGH 2013) survey and 2017 survey. This reduced vegetation cover is visible in the comparison between 2017 and 2018/19 monitoring photographs for plot M07 shown in Plates 3 and 4 which is likely a result of prolonged dryness and associated grazing pressure from herbivores

Table 3.2 Benchmark and monitoring plot data comparison for Black Bluebush low open shrubland– Broken Hill Offset site

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Midstorey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	0	0
Benchmark	13	4%	20%	0%	0%	5%	20%	2%	15%	5%	20%	0	0
Baseline (NGH 2013)	10	0%		0%		52%		24%		0%		0	0
Yr 1 Plot M03	13	0%		0%		16%		20%		34%		0	0
Yr 2 Plot M03	8	0%		0%		0%		14%		2%		0	0

Table 3.3 Benchmark and monitoring plot data comparison for Black Bluebush low open shrubland M07 – Broken Hill Offset site

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Midstorey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	0	0
Benchmark	13	4%	20%	0%	0%	5%	20%	2%	15%	5%	20%	0	0
Baseline (NGH 2013)	n/a	n/a		n/a		n/a		n/a		n/a		0	0
Yr 1 Plot M07	8	0%		0%		4%		12%		58%		0	0
Yr 2 Plot M07	7	0%		0%		0%		6%		0%		0	0

Plate 1 Black Bluebush low open shrubland M03 (2017)

Plate 2 Black Bluebush low open shrubland M03 (2018/19)

Plate 3 Black Bluebush low open shrubland M07 (2017)

Plate 4 Black Bluebush low open shrubland M07 (2018/19)

3.1.2 Mulga-Dead Finish on stony hills

This community is restricted to a small area on a rise in the west of the site where the soils are characteristically shallow and stony. Mulga (*Acacia aneura*) is absent within the offset site however it occurs on the property to the west. Dominant shrubs include Dead Finish (*Acacia tetragonophylla*), *Senna artemisioides* subsp. *filifolia,* Black Bluebush *(Maireana pyramidata)* and Spiny Saltbush (*Rhagodia spinescens)*. The ground cover consists of a patchy distribution of grasses, forbs bare earth and scattered rock. Weed species were low, with predominately the presence of scattered *Medicago* sp. It is considered to be in moderate condition (See Plates 5-6).

The monitoring plot data along with the benchmarks for this vegetation type (DECC 2008) are shown in Table 3.4. Species richness is below the benchmark and below the baseline and 2017 results for this variable. No overstorey cover was recorded in this community due to the general absence of Mulga within the offset site, which based on the benchmark range may be typical of the community. Midstorey cover and groundcover-shrub covers exceed the benchmarks however, they are below the baseline and 2017 results.

Minimal covers of grasses and other native groundcovers were recorded. This result is lower than the benchmark and much lower than the baseline and 2017 results for this community.

Hollow Bearing Trees (HBTs) and fallen logs were absent from this community.

Overall this community is considered to be in moderate condition exhibiting reduced native vegetation cover since the baseline (NGH 2013) survey and 2017 survey. This reduced vegetation cover is visible in the comparison between 2017 and 2018/19 monitoring photographs for plot M07 shown in Plates 3 and 4 which is likely a result of prolonged dryness and associated grazing pressure from herbivores

Plate 5 Mulga - Dead Finish on stony hills M02 2017

Plate 6 Mulga - Dead Finish on stony hills M02 2018/19

Table 3.4 Benchmark and monitoring plot data comparison for Mulga-Dead Finish on stony hills – Broken Hill Offset site

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Midstorey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	0	0
Benchmark	17	0%	3%	1%	3%	1%	5%	1%	5%	1%	5%	0	3
Baseline (NGH 2013)	15	0%		8%		52%		14%		2%		0	0
Yr 1 Plot M02	18	0%		6%		24%		32%		38%		0	0
Yr 2 Plot M02	12	0%		4%		0%		10%		0%		0	0

3.1.3 Prickly Wattle open shrubland

This community typically occurs in drainage lines and depressions across the site. Prickly Wattle (*Acacia victoriae*) dominated the midstorey of this community with no overstorey recorded. Dominant shrubs included; Bladder Saltbush (*Atriplex vesicaria*), Black Bluebush (*Maireana pyramidata*) and Spiny saltbush (*Rhagodia spinescens*). Groundcover is consistent and comprises of shrubs and forbs. Weed infestation was low, with occasional individuals of Velvet Mesquite (*Prosopis velutina*), dead stems of Ward's Weed (*Carrichtera annua*), and Burrr Burr Medic (*Medicago* sp.) present as old fruiting bodies (See Plates 7-8).

The monitoring plot data along with the benchmarks for this vegetation type (DECC 2008) are shown in Table 3.5. The number of native species recorded is at benchmark level and slightly lower than that of the baseline (NGH 2013) and 2017 surveys. Overstorey cover was absent from this community which is consistent with the benchmark and considered typical for this community. Overstorey cover varies from the baseline data (NGH 2013), which is likely due to the allocation of the Prickly Wattle into this category whereas Jacobs has allocated this species to the midstorey category based on the average height of shrubs at approximately one metre. Midstorey cover remains above that of the baseline survey and benchmark and is slightly lower than that of the 2017 survey. Groundcover-shrub cover is significantly greater than the benchmark for this community but less than that recorded in 2017. The cover of grasses other native ground covers was minimal, below benchmark values and much lower than that recorded in the baseline and 2017 surveys. Hollow Bearing Trees (HBTs) and fallen logs were absent from this community.

Overall this community is considered to be in moderate condition. Species richness is at benchmark and similar to that of previous surveys. Native vegetation cover is substantially lower, particularly that of the groundcover layer.

Plate 7 Prickly Wattle low open shrubland M01 in 2017

Plate 8 Prickly Wattle low open shrubland M01 in 2018/19

Table 3.5 Benchmark and monitoring plot data comparison for Prickly Wattle open shrubland – Broken Hill Offset site

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Midstorey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	0	0
Benchmark	11	0%	0.1%	0%	0%	2%	20%	1%	10%	1%	20%	0	0
Baseline (NGH 2013)	12	7%		5%		14%		38%		2%		0	1.5
Yr 1 Plot M01	12	10%		16%		8%		32%		28%		0	0
Yr 2 Plot M01	11	0%		21%		0%		22%		0%		0	0

3.1.4 Narrow-leaved Hopbush – Scrub Turpentine – Senna shrubland

This vegetation type occurs as discrete patches along the northern boundary of the site. The midstorey is dominated by *Senna phyllodinea* and *Senna artemisioides* subsp. *filifolia.* Groundcover is dominated by a range of shrubs including; Black Bluebush (*Maireana* pyramidata), Low Bluebush (*Maireana astrotricha*) and Spiny saltbush (*Rhagodia spinescens*). Other native groundcovers include a range of forbs. Weed infestation is moderate within this community and includes Onion Weed (*Asphodelus fistulosus*), and Burr Medic (*Medicago* sp). Species diversity was greatest in this community. The proximity to the access road along the northern boundary may explain the greater infestation of weeds (See Plates 9-10).

The monitoring plot data along with the benchmarks for this vegetation type (DECC 2008) are shown in Table 3.6. The number of species recorded was considerably higher than the benchmark, lower than the baseline survey result (NGH 2013) and slightly lower than that of the 2017 survey. Overstorey cover was absent from this community which is below the benchmark and baseline data (NGH 2013). The midstorey cover for this community was within benchmarks, above the baseline survey (NGH 2013) but below the 2017 value. The difference in the baseline and current survey data for the midstorey may be attributable to the allocation of some species to the overstorey by NGH (2013) and understorey by Jacobs (2017). Jacobs (2017) recorded the average height of the tallest shrubs, *Senna* spp., as approximately one metre and as such these species were categorised as midstorey plants. Groundcover-shrub cover was within the benchmark range but much lower than that recorded during the baseline and 2017 surveys. The cover of grasses other native ground covers was minimal, below benchmark values and much lower than that recorded in the baseline and 2017 surveys. Hollow Bearing Trees (HBTs) and fallen logs were absent from this community.

Overall this community is considered to be in moderate condition. Species richness is above the benchmark and similar to that of previous surveys. Native vegetation cover is substantially lower, particularly that of the groundcover layer.

Plate 9 Narrow-leaved Hopbush – Scrub Turpentine - Senna Shrubland M04 in 2017

Plate 10 Narrow-leaved Hopbush – Scrub Turpentine - Senna Shrubland M04 in 2018/19

Table 3.6 Benchmark and monitoring plot data comparison for Senna shrubland – Broken Hill Offset site

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Midstorey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	0	0
Benchmark	12	1%	14%	1%	8%	5%	25%	2%	15%	2%	25%	0	2
Baseline (NGH 2013)	23	3%		0%		48%		24%		2%		0	0
Yr 1 Plot M04	20	0%		10%		0%		34%		24%		0	0
Yr 2 Plot M04	19	0%		4%		0%		6%		0%		0	0

3.1.5 Old Man Saltbush shrubland

This community appears to occur naturally adjacent to the drainage line along the eastern side of the offset site and has spread to the man-made drainage line in the south of the site following disturbance. Natural occurrences of this community are rare within the landscape and due to its reduction in extent and poor representation within the reserve system, it is considered to be of conservation concern (Benson 2006) (See Plates 11-14).

The midstorey of this community is dominated by Old Man Saltbush (*Atriplex nummularia*) and Black Bluebush (*Maireana pyramidata*). Bladder Saltbush (*Atriplex vesicaria*), Ruby Saltbush (*Enchylaena tomentosa*) and Spiny Saltbush (*Rhagodia spinescens*) make up the shrub component of the ground layer. Weed infestation is moderate in this vegetation community and includes; Ward's Weed (*Carrichtera annua*), Prostrate Heliotrope (*Heliotropium supinum),* and African Boxthorn (*Lycium ferocissimum*).

The monitoring plot data along with the benchmarks for this vegetation type (DECC 2008) are shown in Table 3.7 and Table 3.8. This community was not surveyed by NGH (2013) so no baseline data has been collected and as such, this current survey data will form the baseline for this community. On average across the two monitoring plots for this community the number of species recorded increased slightly in comparison with the 2017 survey but remained slightly below the benchmark.

Overstorey cover was absent from this community which is below the benchmark data. Midstorey cover was significantly greater than the benchmark. No native grass cover was recorded across the transect which is comparable to the lower end of the benchmark value range. Groundcover-shrub cover was at the upper end of the benchmark range and other native groundcovers (excluding grasses) was within the benchmarks but towards the lower end of the range.

Overall this vegetation community is in moderate condition.

Plate 11 Old Man Saltbush shrubland M05 in 2017

Plate 12 Old Man Saltbush shrubland M05 in 2018/19

Plate 13 Old Man Saltbush shrubland M06 in 2017

Plate 14 Old Man Saltbush shrubland M06 in 218/19

Table 3.7 Benchmark and monitoring plot data comparison for Old Man Saltbush shrubland – Broken Hill Offset site

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Midstorey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	0	0
Benchmark	15	2%	20%	0%	3%	0%	10%	1%	20%	0%	5%	0	0
Baseline (NGH 2013)	n/a	n/a		n/a		n/a		n/a		n/a		n/a	n/a
Yr 1 Plot M05	9	0%		64%		0%		34%		16%		0	0
Yr 2 Plot M05	10	0%		39%		0%		20%		2%		0	0

Table 3.8 Benchmark and monitoring plot data comparison for Old Man Saltbush shrubland – Broken Hill Offset site

	Native Spp. #	Native Cover				Native Groundcover						HBTs	Logs
		Overstorey		Midstorey		Grasses		Shrubs		Other			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	0	0
Benchmark	15	2%	20%	0%	3%	0%	10%	1%	20%	0%	5%	0	0
Baseline	n/a	n/a		n/a		n/a		n/a		n/a		n/a	n/a
Yr 1 Plot M06	11	0%		3%		0%		74%		16%		0	0
Yr 2 Plot M06	13	0%		10%		0%		22%		0%		0	0

3.2 Weeds and disturbance

Overall weed infestation across the site was considered to be low to moderate. Monitoring plots M05 and M06, recorded the greatest coverage and diversity of weeds. This is likely to be due to disturbances related to the construction of the man-made drainage line at the southern end of the site.

The centre of the site (see Figure 2.2 and Plate 7) also has a significant infestation of Peppercorn tree (*Schinus molle var. areira*). The Peppercorn trees, being the only overstorey vegetation (>3m) within the offset site and providing shelter from predators and the harsh climatic conditions, are currently providing habitat for a number of active babbler (*Pomatostomus* sp.) nests and other bird species. As such, complete removal of this infestation is not recommended at this stage. Management may instead require thinning of mature trees without active nests, herbicide treatment of any emerging saplings and replacement planting with taller native species once rainfall conditions allow (e.g. *Casuarina pauper, Alectryon oleifolius subsp. canescens, Acacia victoriae, Acacia aneura* and *Acacia tetragonophylla*).

Two of the weeds recorded within the site, Velvet Mesquite (*Prosopis velutina*) and African Boxthorn (*Lycium ferocissimum*) are declared as state and regional priority weeds under the *Biosecurity Act 2015,* as listed in Appendix 1.1 and 1.2 of the Western Regional Strategic Weed Management Plan 2017-2022 (LLS 2017). Velvet Mesquite was common within the drainage lines in the east of the site and African Boxthorn was detected within the man-made drainage depression in the south of the site. Both of these weeds are also listed as Weeds of National Significance and are required to be eradicated from the land and the land is to be kept free of the plant so as to mitigate the risk of the plant spreading. These weed species are also recorded on the Office of Environment and Heritage (OEH) 'High Threat' weeds list. The abundance of living Velvet Mesquite and African Boxthorn was substantially lower than during the 2017 survey and dead individuals were observed, indicating that management of these species has been effective but needs to continue in order to achieve eradication and prevention of re-establishment.

In general spot herbicide-treatment is required for weed species across the site (see Appendix A), concentrating on perennial weeds and those areas identified as having the greatest need, i.e. around disturbance areas such as the man-made drainage line to the south of the site, along site boundaries adjacent to access roads and other areas disturbed by the formation of tracks.

A complete list of weeds that may be targeted for management, including, spot spraying are listed in Appendix A.

Plate 15 Pepper Tree infestation towards the centre of the site (see Figure 2.2)

3.3 Fauna Habitats

Table 3.9 show the percentage habitat cover at each of the monitoring plots surveyed and compares these to the baseline data recorded in the BOMP (NGH 2013). Throughout the offset site chenopods and bare ground provide the greatest habitat, which is comparable to the baseline survey results recorded by NGH (2013). Tussock grass habitat has decreased across the site in general which may be a result of grazing by kangaroos during what has been a prolonged dry period with little alternative food resources. Grasses may have also decreased due to the drier climatic conditions experienced since the baseline survey (NGH 2013). Rocky habitat occurs towards the southern end of the site. Numerous skinks were observed using the various habitats across the site during the survey.

A Peppercorn tree infestation towards the centre of the site (see Figure 2.2) provides habitat in the form of shelter from predators and the harsh climatic conditions as well as for nesting, as evident by the numerous babblers' nests observed.

Overall habitat appears to have been maintained since the baseline surveys undertaken by NGH (2013), with the exception of the reduction in tussock grasses and other groundcover vegetation across the site. The fencing will assist in excluding goats and any livestock from the site, which may assist in the natural regeneration of the site when drought condition subside and hence improve habitat condition.

Plate 16 Shingleback lizard (*Tiliqua rugosa)* observed within the offset site

Table 3.9 Habitat cover assessment – Broken Hill Offset site

Habitat component	cover estimates to nearest 5%																	
	Baseline M01	Year 1 M01	Year 2 M01	Baseline M02	Year 1 M02	Year 2 M02	Baseline M03	Year 1 M03	Year 2 M03	Baseline M04	Year 1 M04	Year 2 M04	Year 1 M05	Year 2 M05	Year 1 M06	Year 2 M06	Year 1 M07	Year 2 M07
Tussock grasses	<5%	0%	0%	70%	0%	0%	50%	<5%	0%	60%	0%	0%	0%	0%	0%	0%	0%	0%
Chenopods	40%	50%	25%	5%	20%	15%	20%	50%	15%	20%	25%	10%	10%	10%	10%	5%	10%	5%
Trees/tall shrubs	15%	15%	10%	0%	<5%	<5%	0%	0%	0%	0%	<5%	<5%	<5%	<5%	<5%	5%	0%	0%
Bare ground	60%	45%	50%	30%	25%	65%	50%	50%	75%	40%	40%	70%	10%	30%	10%	40%	45%	75%
Cracking clay	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rocks/logs	<5%	10%	10%	10%	10%	10%	10%	5%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%

3.4 Results summary and discussion

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

3.4.1 Species richness

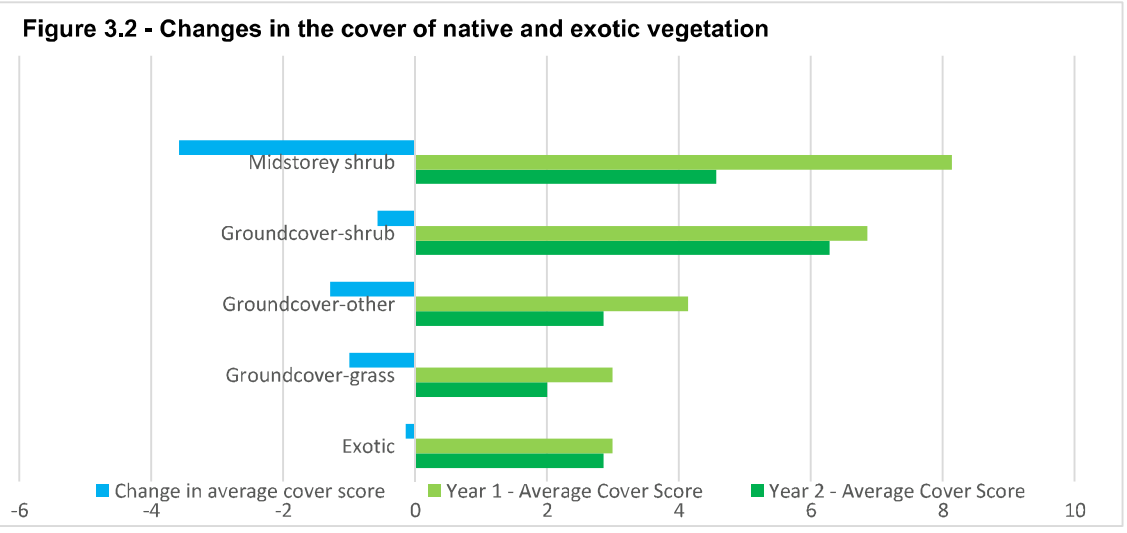
Species richness was below 2017 and benchmark levels for most plots and the mean species richness was also lower (refer Figure 3.1). The groundcover forb component of the vegetation seems to have been the most reduced with many previously recorded annual and short-lived perennial species no longer apparent.

Figure 3.1 - Changes in Species Richness

3.4.2 Cover of native and exotic vegetation

The cover of native vegetation has reduced in comparison with 2017 levels for all structural layers with the most pronounced reduction observed in the cover of midstorey shrubs, groundcover grasses and other groundcover plants (See Figure 3.2).

Figure 3.2 - Changes in the cover of native and exotic vegetation



Although, the midstorey shrub layer was lower than in 2017, it was still within or above benchmark levels for each plant community. The covers of grasses and other groundcovers were however much lower than 2017 levels and well below benchmark levels (refer Figure 3.3 and Figure 3.4).

There has been a small reduction in the abundance of exotic species. This change is likely to be attributable to a combination of drought conditions and weed management on the site.

Figure 3.3 - Changes in grass cover compared with benchmarks

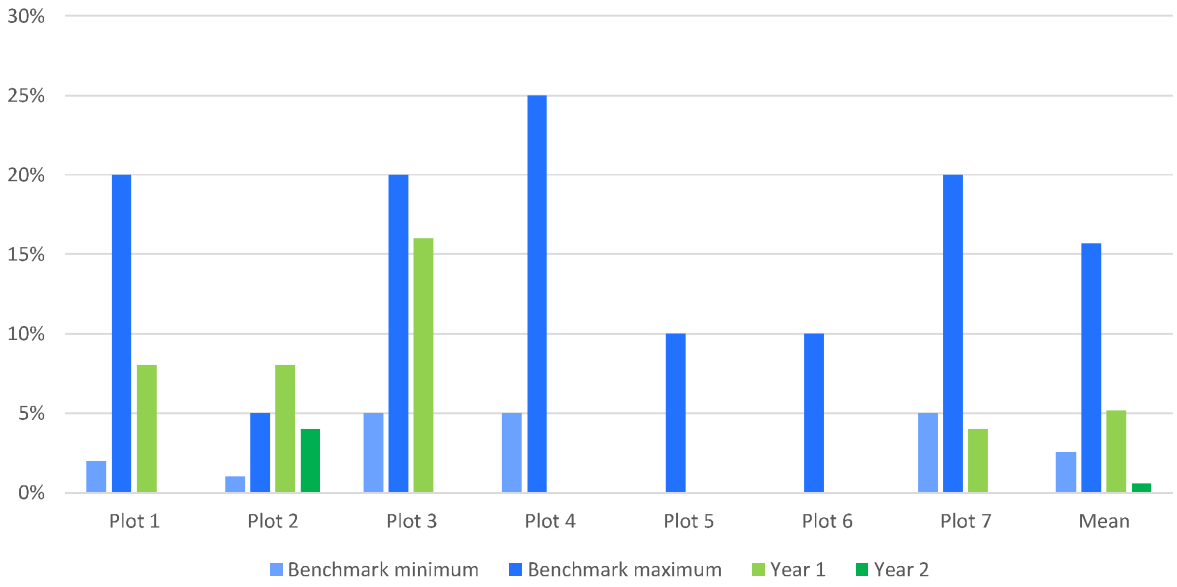
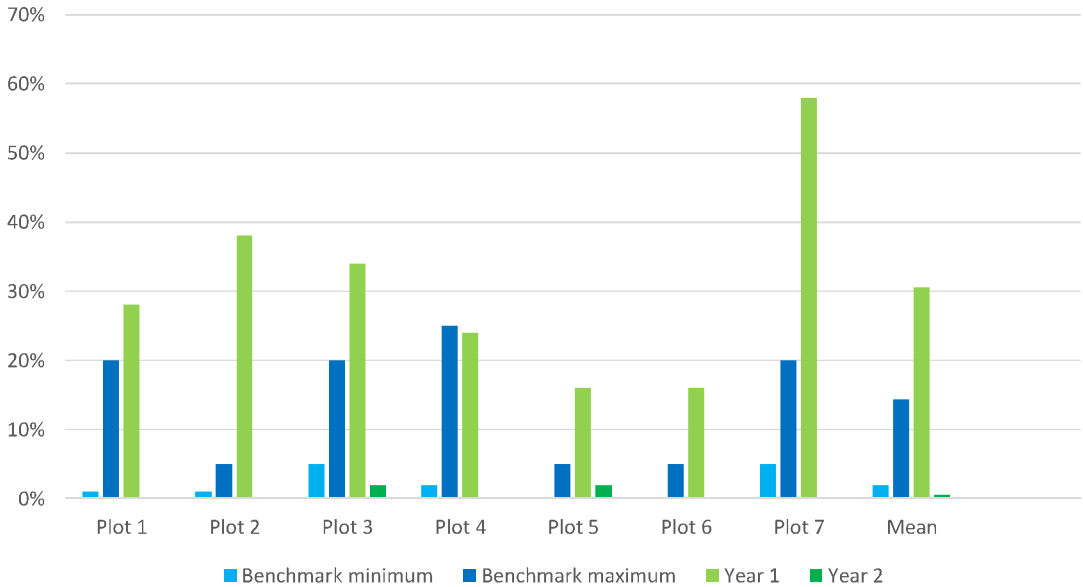


Figure 3.4 - Native groundcover - other



3.4.3 Discussion

The observed reduction in species richness and native vegetation cover is most likely a result of prolonged below average rainfall at the site. These annual and short-lived perennial groundcover species are likely to

naturally fluctuate in abundance in response to rainfall and are likely to persist on the site in the form of a soil-stored seedbank during unfavourable conditions. Grasses seem to have been affected by kangaroo grazing in addition to drought and were generally reduced to shortly-cropped small clumps. Some specimens of midstorey shrubs have died due to drought and many have many of their leaves, resulting in reduced foliage cover. A future return to an extended period of average or higher rainfall will likely see a return of annual and short-lived perennial groundcover species and recovery of the foliage cover of grasses and shrubs.

The monitoring has shown a reduction in the diversity and abundance of native plants and the overall condition of native vegetation on the site. This change is likely to be caused primarily by the prevailing drought conditions and any effect of site management is difficult to detect under these conditions. Additional monitoring under such drought conditions is unlikely to yield meaningful information regarding the improvement or maintenance of biodiversity values.

3.5 Fence maintenance

Stock proof fences were installed on the offset site approximately in mid-2017 and as such are in near new condition (refer to Plates 17 and 18) requiring no maintenance at present. A combination of ring lock style of fencing and plain and barbed wire strand fencing has been used across the site. Livestock and feral goats were absent from the site during fencing and are now effectively excluded. The fence is not designed to be rabbit-proof, and rabbit-proofing is not required. The entire site is fenced. Fences are generally located on the boundary of the site (i.e. the perimeter of the site), with the exception of the eastern fence which is between about 50m and 150m west of the eastern site boundary as mapped in the Biodiversity Offset Management Plan, Broken Hill Solar Plant (NGH Environmental, 2013). Red Kangaroos and Western Red Kangaroos were observed within the site and were seen to traverse the fences. Fencing is likely to improve the natural regeneration of the site through the exclusion of livestock and feral goats.

Plate 17 Ring-lock fencing along northern boundary of the site

Plate 18 Plain wire and barbed wire fencing along the western boundary of the site

4. Management Actions

The following management measures in Table 4.1 were outlined in the BOMP (NGH 2013) and were to be actioned and adapted based on annual monitoring results. Table 4.1 provides an evaluation of the need for each management action, the timing, and who is required to undertake the action. Actions undertaken since previous monitoring session and recommended adaptive measures are also described.

Table 4.1 : Management Actions undertaken and required at the Broken Hill offset site

Management measure	Objective	Action	Timing	Who	Actions undertaken since previous monitoring session	Adaptive measures if required
Weed control	Target state and regional priority weeds (Mesquite and African Boxthorn) to eliminate from site and prevent spread as required under the *Biosecurity Act* 2015 and the Western Regional Strategic Weed Management Plan 2017 – 2022 (LLS 2017)	Spot herbicide treatment; foliar spraying or cut/scape and paint methods	During active growth season, which is generally in Spring to early Summer, particularly after rainfall. Should be undertaken in suitable low wind conditions so as to prevent spray drift to other native species.	Professional bush regeneration contractor with appropriate chemical use certification.	Initial spraying of Mesquite and African Boxthorn completed across site by Centrogen.	Dry conditions are likely to have limited the effectiveness of herbicide treatment. Monitoring and treatment of re-shooting plants and seedlings required.
	Target Peppercorn Tree infestation	Thinning of mature trees without active nests and new saplings to be targeted using hand removal and cut and paint techniques. Replacement planting of mature trees removed with native trees and tall shrubs.	During active growth season, which is generally in Spring to early Summer, particularly after rainfall. Planting to be undertaken after drought conditions subside and several successive months of average or above average rainfall.	Professional bush regeneration contractor with appropriate chemical use certification.	No treatment / removal occurred on this as the landowner was concerned about impacts on habitat for birds and other wildlife.	Centrogen to discuss further with the landowner and, with agreement, undertake limited treatment in April-May 2019 in conjunction with planting. Gradual thinning of mature trees without active nests only as these trees are currently providing habitat for native birds. Target all saplings.

Management measure	Objective	Action	Timing	Who	Actions undertaken since previous monitoring session	Adaptive measures if required
	Target onion weed and saffron thistle in general weeding across the site	Spot spraying	During active growth season, which is generally in Spring to early Summer, particularly after rainfall. Should be undertaken in suitable low wind conditions so as to prevent spray drift to other native species.	Professional bush regeneration contractor with appropriate chemical use certification.	None undertaken as plants are withered and reduced to underground parts and seeds during current dry conditions.	Target these species when they reappear following rain.
Cat and/or fox control	To minimise the presence of cats and foxes within the offset site.	Conduct baiting or trapping if evidence of cats or foxes is detected within the offset area. None required at this stage. Re-evaluate during next monitoring event; spotlighting and/or camera trap surveys are recommended to be undertaken during 2019-2020 to inform management.	Annual monitoring. Control in response to detection of cats or foxes.	Professional animal control contractor with appropriate qualifications and permits.	-	-
Rabbit control	To control rabbit numbers within the site and thereby prevent rabbits from substantially impacting on native flora and habitat values.	None required at this stage. Allow native vegetation to regenerate over the next year. Re-evaluate during next monitoring event.	Annual monitoring. Control in response to detection of cats or foxes.	Professional animal control contractor with appropriate qualifications and permits.	-	-

Management measure	Objective	Action	Timing	Who	Actions undertaken since previous monitoring session	Adaptive measures if required
Exclusion of feral goats and livestock	To continuously exclude large non-native herbivores from the site and reduce grazing on native flora	A fence to exclude goats and livestock is present, no further actions required at this stage. Allow native vegetation to regenerate over the next year and then re-evaluate fencing effectiveness during next monitoring event.	-	-	-	-
Implementation of controlled burns	To improve the natural regeneration of native flora	None required at this stage. Allow native vegetation to regenerate over the next year. Re-evaluate during next monitoring event.	-	-	-	-
Monitoring plot survey	Repeat monitoring plot surveys to evaluate the 'improve or maintain' outcome of biodiversity values at the site	Repeat monitoring of all plots within the offset site	Late spring	Two qualified Ecologists	-	Where possible time survey events to occur within four weeks of a significant rainfall event so as to better identify the diversity of plant species dormant within the ground layer

5. Conclusions and recommendations

As per the requirements of the Conditions of Approval (COA) the biodiversity offset site is required to be monitored and the results reported annually to the NSW Office of Environment and Heritage (OEH). Condition C5(b) specifically states that the biodiversity outcome to be achieved must 'improve or maintain' the biodiversity values of the site. Following the completion of fencing, this report outlines the results of the second monitoring survey for the offset site since the baseline study recorded in the Biodiversity Offset Management Plan (BOMP) by NGH (2013).

Overall the recent monitoring results show a reduction in biodiversity values across the site with regards to floristic diversity, coverage and quality when compared to the vegetation community benchmarks (DECC 2008), baseline survey and 2017 results. Prolonged periods of dryness have inhibited the growth of many plant species and a number of species were not able to be identified. It is likely that seed stock lay dormant within the ground. Adequate rainfall would further increase the species diversity at the site. The management actions outlined in Table 4.1 will further assist the natural regeneration of the site over the next 12 months, an overview of these is provided below.

Stock proof fencing around the offset site has only relatively recently been installed and as such is in near new condition. It is likely that with the fencing in place the biodiversity values of the site will continue to improve through the exclusion of feral goats and any livestock, allowing further opportunities for natural regeneration to occur once normal rainfall conditions return.

Fauna habitats across the site are somewhat diverse and include; bare ground, chenopods, rocky patches, tussock grasses and some taller shrubs. These habitats have been maintained, with the exception of the groundcover habitat. Tussock grass habitats may improve with the installation of fencing and consequent exclusion of grazing from feral goats. Any return to near average or greater rainfall is also likely to improve the regeneration of groundcover vegetation. With the fences now in place no further feral pest management is recommended until after a re-evaluation of vegetation condition and fauna habitats following a return to normal rainfall conditions.

Weed infestations across the site are generally low and can be maintained by spot treatment as outlined in the management actions. Weeds of particular concern include the state and regional priority weeds (LLS 2017) Velvet Mesquite and African Boxthorn, which are required to be eradicated from the site so as to prevent further spread to surrounding lands. Pepper Tree infestations within the centre of the site provide habitat for a variety of birds. There are numerous active babbler nests throughout these trees and as such complete removal is not recommended. Control of emerging samplings, selective thinning of those trees not containing nests and replacement planting with native trees and tall shrubs would allow for the maintenance of fauna habitat while gradually removing the Pepper Trees.

It is recommended that future monitoring continue be scheduled after a return to average or higher rainfall conditions to provide a more meaningful comparison with benchmark conditions which are based on vegetation measurement during average rainfall conditions.

6. References

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LLS (2017) Western Regional Strategic Weed Management Plan 2017 – 2022. New South Wales Local Land Services Western Region http://western.lls.nsw.gov.au/__data/assets/pdf_file/0006/722391/Western-RSWMP-web.pdf

NGH Environmental (2013) *Biodiversity Offset Management Plan, Broken Hill Solar Plant.* Report prepared for AGL Energy Limited.

OEH (2012) Vegetation types database. Office of Environment and Heritage NSW. http://www.environment.nsw.gov.au/biobanking/VegTypeDatabase.htm

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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	Scientific Name	Common Name	M 01	M 02	M 03	M 04	M 05	M 06	M 07	Previously recorded on site
Aizoaceae	*Sarcozona praecox*	Sarcozona		1				2	2	
Amaranthaceae	*Alternanthera angustifolia*									x
Anacardiaceae	*Schinus molle var. areira**	Peppercorn Tree								x
Apocynaceae	*Rhyncharrhena linearis*	Purple Pentatrope								x
Asphodelaceae	*Asphodelus fistulosus**	Onion weed				1				
Asphodelaceae	*Bulbine* sp.	Bulbine lily								x
Asteraceae	*Brachyscome ciliaris var. lanuginosa*		1							
Asteraceae	*Brachyscome dentata*									x
Asteraceae	*Carthamus lanatus**	Saffron thistle				1				
Asteraceae	*Leiocarpa semicalva*		2		1					
Asteraceae	*Senecio lanibracteus*					1				x
Asteraceae	*Sonchus oleraceus**	Common Sowthistle								
Asteraceae	*Vittadinia cuneata*	Fuzzweed								x
Asteraceae	*Xanthium spinosum**	Bathurst Burr								x
Boraginaceae	*Heliotropium supinum**	Prostrate Heliotrope				1	1	1		
Boraginaceae	*Echium plantagineum**	Paterson's Curse								x
Brassicaceae	*Arabidella sp.*						2	1		
Brassicaceae	*Carrichtera annua**		2			1	2	1		
Chenopodiaceae	*Atriplex nummularia*	Old Man Saltbush					4	1	1	
Chenopodiaceae	*Atriplex stipitata*	Mallee Saltbush	1	1		2				
Chenopodiaceae	*Atriplex vesicaria*	Bladder Saltbush	2					1	1	
Chenopodiaceae	*Dissocarpus paradoxus*	Cannonball Burr			2	1		1		
Chenopodiaceae	*Enchylaena tomentosa*	Ruby Saltbush		1	2	2		2		

Chenopodiaceae	*Maireana astrotricha*	Low Bluebush				1				
Chenopodiaceae	*Maireana coronata*	Crown Fissure-weed								
Chenopodiaceae	*Maireana pyramidata*	Black Bluebush	3	2	4	3	3	3	3	
Chenopodiaceae	*Maireana* sp.								1	
Chenopodiaceae	*Rhagodia spinescens*	Spiny saltbush	2	1		2	1	2		
Chenopodiaceae	*Salsola australis*			1		1		1		x
Chenopodiaceae	*Sclerolaena divaricata*	Tangled Copperburr		1	1					
Chenopodiaceae	*Sclerolaena* sp.	Copperburr			1	2		1	2	
Convolvulaceae	*Convolvulus remotus*					1				
Crassulaceae	*Crassula tetramera*									x
Euphorbiaceae	*Euphorbia multifaria*									x
Fabaceae	*Acacia burkittii*	Sand hill wattle								x
Fabaceae	*Acacia oswaldii*	Umbrella wattle								x
Fabaceae	*Acacia tetragonophylla*	Dead finish		2						
Fabaceae	*Acacia victoriae*	Prickly wattle	2	2		2		1		
Fabaceae	*Medicago* sp.*		1	1	1	1	1	1		
Fabaceae	*Prosopis velutina***	Velvet mesquite	1							
Fabaceae	*Senna artemisioides* subsp. *filifolia*			3		2		1		
Fabaceae	*Senna phyllodinea*					3				
Fabaceae	*Vicia* sp.*									
Lamiaceae	*Salvia verbenaca**	Vervain								x
Loranthaceae	*Lysiana exocarpi*									x
Malvaceae	*Sida corrugata*	Corrugated sida				1				
Malvaceae	*Sida* sp.		2			1				
Myrtaceae	*Eucalyptus camaldulensis*	River Red Gum								x
Pittosporaceae	*Pittosporum angustifolium*	Weeping pittosporum								x
Poaceae	*Austrostipa scabra* subsp. *scabra*	Speargrass		1	2	1		1		
Poaceae	*Chloris truncata*	Windmill grass								x
Poaceae	*Cymbopogon ambiguus*	Scent grass								x

Poaceae	*Enneapogon avenaceus*	Bottle Washers	1	1	1	1	1			
Poaceae	*Rytidosperma caespitosum*	Ringed Wallaby Grass	1							
Poaceae	*Tragus australianus*	Small Burrgrass	1			1				
Polygonaceae	*Rumex crispus**	Curled dock								x
Portulacaceae	*Portulaca oleracea*	Pigweed								x
Scrophulariaceae	*Eremophila sturtii*	Narrow-leaf Emu Bush								x
Scrophulariaceae	*Myoporum montanum*	Western Boobialla								x
Solanaceae	*Lycium ferocissimum***	African boxthorn						1	1	
Solanaceae	*Solanum esuriale*	Quena					2			
Solanaceae	*Solanum* sp.					2				
Zygophyllaceae	*Tribulus minutus*									x
* general weed										
**state and regional weeds to be targeted (Biosecurity Act 2015)										

Table A.2 Opportunistic fauna species list

Class	Species	Common Name
Aves	*Pomatostomus spp.*	A Babbler species
	Dromaius novaehollandiae	Emu
	Corvus coronoides	Australian Raven
	Eolophus roseicapilla	Galah
Mammalia	*Macropus rufus*	Red Kangaroo
	Macropus fuliginosus	Western Grey Kangaroo
Reptilia	*Tiliqua rugosa*	Shingleback lizard
	Ctenotus sp.	A skink 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.