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Tharbogang Quarry and Landfill Offset Monitoring Annual Monitoring Report 2017



Lots 181 and 182 // DP 756035

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Glossary and abbreviations

Acronym	Description
DNG	Derived native grassland
LLS	Local Land Services
MZ	Management Zone
OEH	Office of Environment and Heritage

1. Introduction

Ecoplanning was commissioned to prepare Annual Monitoring Report 2017 to comply with the Conservation Agreement between the Minister Administering the *National Parks and Wildlife Act 1974* and Griffith City Council for Tharbogang Quarry and Landfill (2015). This report complies with Annexure D of the Conservation Agreement, to satisfy a commitment made to secure a biodiversity offset relating to the expansion of the existing landfill and quarry. The subject site is located at Lots 181 and 182 in Deposited Plan 756035 (known as Tharbogang Quarry and Landfill), approximately 10 kilometres (km) northwest of Griffith.

Monitoring of the offset site is undertaken annually, with this report documenting year 2 of monitoring under the Conservation Agreement.

The Conservation Agreement requires that the annual monitoring report is to include:

- a description of all completed management actions undertaken in the previous 12 month period
- copies of all receipts from third party contractors engaged by the owner to undertake management actions listed in items 1 and 2 of Annexure C to the Conservation Agreement
- completed monitoring data sheets (including photographs) using the template provided in Table 4 of Annexure D to the Conservation Agreement (below) and also including quarterly inspection data and stock impact data collected by the owner
- a discussion of the changes recorded at photo monitoring points and quadrats
- a discussion of the condition of Conservation Values
- a discussion of effectiveness of any management actions implemented
- recommendations and proposed management actions to be performed in following year.

2. Monitoring Methodology

Monitoring was consistent with Annexure D of the Conservation Agreement, and included:

- Photos points
- Biometric data
- Fauna monitoring
- Walk through assessment.

Four photos (one in each cardinal direction) were taken at each of the eight monitoring photo points and six Biobanking monitoring points. Notes were taken on the presence of weeds, erosion, vegetation condition. Vegetation condition and management issues were compared to previous years.

Floristic data were collected at each of the six BioBanking monitoring sites in accordance with the Biobanking Assessment Methodology (2014) and compared with baseline (collected in 2015) and benchmark data.

Surveys for microchiropteran bats were conducted in each management zone. The sites surveyed were the same as those in 2016. An Anabat Express, Anabat Swift and Songmeter SM3Bat were used for the survey. Echolocation calls were recorded over two nights and were activated 1 hour before sunset until 1 hour after sunrise. A single night of data was collected from a fourth site in open woodland using both the Anabat Swift and Anabat Express.

Bird surveys were undertaken at the same sites as in 2016: one site in DNG (MZ1), two in open woodland (MZ2) and two in woodland (MZ3) and one in *Callitris* Woodland. At each 2 ha site, a 20 minute survey was conducted in the morning and at dusk over two consecutive days. All birds seen or heard were recorded.

The offset site was traversed to record opportunistic sightings within the Conservation Area. The current survey recorded weed species, evidence of pest animals, natural regeneration of previously disturbed areas and sightings of threatened species.

3. Completed Management Actions

Table 3.1: Management actions for Year 2, 2017 monitoring period.

Management Action	Timing	Status
Monitoring Biobanking monitoring plots and photo points	Year 2	Complete – results of monitoring are provided
Recommend weed management thresholds and commence weed management actions in the Conservation Area in Year 1	Years 1 - 3	Weed management occurred during 2017 targeting <i>Lycium ferocissimum</i> (African Boxthorn) and <i>Opuntia</i> sp.
Pest animal control (local co-ordination with LLS and OEH)	Years 1 - 10	No pest animal control actions were undertaken.
	Years 1 – 3 Initial Rabbit Control	No pest animal control actions were undertaken. No Rabbits, evidence of Rabbits, were observed during the survey.
	Years 1-10 Fox Control	No pest animal control actions were undertaken. Foxes were observed on two occasions in the offset site.
	Years 1 – 10 Feral Goat Control	No pest animal control actions were undertaken. No Feral Goats, or evidence of Feral Goats were observed during monitoring.
	Years 1 – 10 Feral Cat Control	No pest animal control actions were undertaken. No Feral Cats, or evidence of Feral Cats, were observed during the survey.
Fire management hazard reduction burn	Years 1 – 10	No fire management actions were undertaken.
Maintain vehicle access to Conservation Area for fire management, weed and fencing management.	Year 1	Fire trails were re-graded in the offset site on 25/11/2017.
Fencing, gates and signage	Year 1	The boundary of the offset area has been fenced and signage erected. Western fence line completed in December 2017. The northern boundary fence completed in March 2018.
Quarterly inspections and stock management data	Year 1	Inspections were conducted in February, September and December 2017. No grazing occurred in year 2.

Management Action	Timing	Status
Annual Reports for Monitoring Program	Years 1 -10	Monitoring was conducted in September 2017.

4. Photo Monitoring Points and Quadrats

Photo points were visited between 18 and 20 September 2017.

Photo point 1 (PP1) (from top left bearing N, E, S, W).

Photo point monitors an eroded channel and pasture weeds. During baseline survey erosion of the channel appeared stable and weeds were primarily *Echium plantagineum*, *Arctotheca calendula*, *Hordeum leporinum*, *Lolium rigidum*, and *Bromus* sp. There was no evidence of regeneration of the native canopy. The ground layer included scattered natives such as *Vittadinia cuneata*, *Maireana* sp. and *Erodium crinitum*. Minor dieback was evident in canopy trees to the south.

Erosion: Monitoring in 2017 did not observe active erosion.

Vegetation - general: Vegetation height and biomass was much lower than previous years due to below average rainfall. Some weeds that were previously dominant (*Arctotheca calendula* and *Echium plantagineum*) provided a low cover in 2017.

Vegetation cover: Groundcover was estimated to be 90% in the area surrounding the photo point.

Canopy trees: Tree canopies appeared to be denser suggesting that the previous wet year promoted recovery of the tree canopy. There was no change to the recruitment of canopy species.



Photo point 2 (PP2) (W, N, E, S)

Photo point monitors an eroded channel, pasture weeds and woodland heath. During baseline survey common weeds were *Arctotheca calendula*, *Sisymbrium erysimoides*, *Hordeum leporinum* and *Bromus* sp. The canopy was in a relatively good condition with scattered regeneration of *Callitris glaucophylla* but no visible regeneration of eucalypts. Erosion appeared inactive along the drainage line and stabilised by vegetation cover.

Erosion: Monitoring in 2017 did not observe active erosion.

Vegetation – general: Vegetation height was much lower than previous years. A predominantly dry winter and early spring reduced the biomass considerably from previous years, and some weeds that were previously dominant (*Arctotheca calendula* and *Echium plantagineum*) provided a low cover in 2017. *Hordeum leporinum* was common.

Vegetation cover: The groundcover was estimated to be 20% in the area surrounding the photo point, with a very high cover of litter (~70%). The canopy had an estimated cover of 15% and the midstorey was composed on regrowth canopy species (5% cover).

Canopy trees: Tree canopies appeared to be in good condition. There was no change to the recruitment of canopy species.



Photo point 3 (PP3) (E, S, W, N)

Photo point monitors a weed infested area, which during baseline survey included priority weeds (formerly termed noxious weeds) *Lycium ferocissimum*, *Marrubium vulgare* and *Opuntia* sp. and other weeds such as *Hordeum leporinum*, *Echium plantagineum* and *Arctotheca calendula*. The eucalypt canopy was in good condition but no regeneration was observed.

Vegetation - general: Vegetation height was much lower than previous years. A predominantly dry winter and early spring reduced the biomass considerably from previous years. *Hordeum leporinum* was common in 2017.

Vegetation cover: The groundcover was estimated to be 30% in the area surrounding the photo point, with a very high cover of litter (~65%). The canopy had a 5% cover and the midstorey 1%.

Weeds: Contractors had sprayed *Lycium ferocissimum*, however, some plants were resprouting and require follow up treatment. *Opuntia* sp. had also been sprayed; while there was some browning of the upper surface of plants, more time is required to determine if the plants will die from this treatment. *Marrubium vulgare* had not been treated.

Canopy trees: Regeneration of *Eucalyptus populnea* was observed. There were no signs of canopy dieback.



Photo point 4 (E, S, W, N)

Photo point monitors priority weeds and eucalypt health. Priority weeds observed in the baseline survey included *Lycium ferocissimum*, *Marrubium vulgare* and *Opuntia* sp. Other weeds at the site included *Echium plantagineum* and *Hordeum leporinum*. Some minor dieback of eucalypts was observed in the south, with scattered regrowth of *Callitris* observed in the west. ELA (2016) notes a discrepancy in the orientation of the photo point images between 2015 and 2016, which is likely attributed to the effect of the steel star picket on the compass. The orientation of 2017 photos matches the 2016 orientation of photos.

Vegetation - general: Vegetation height was much lower than previous years. A predominantly dry winter and early spring reduced the biomass considerably from previous years.

Vegetative cover: The ground cover was estimated to be 50% in the area surrounding the photo point (*Hordeum leporinum* common), with a high cover of litter (~45%). The canopy had an estimated cover of 10%

Weeds: Contractors had sprayed *Lycium ferocissimum*, however, some plants were resprouting and require follow up treatment. *Marrubium vulgare* had not been treated.

Canopy trees: There were no signs of canopy dieback. Canopy trees appeared to be in good condition.



Photo point 5 (N, E, S, W)

Photo point monitors priority weeds and eucalyptus health. During baseline survey the priority weed *Marrubium vulgare* was recorded, with a high cover of other weeds (*Hordeum leporinum*) around the base of the eucalypts. Beyond this, vegetation was dominated by areas of low growing, native dominated ground covers. Canopy was in good condition with no evidence of dieback and eucalypt recruitment observed in the south.

Vegetation – general: Vegetation height was much lower than previous years. A predominantly dry winter and early spring reduced the biomass considerably from previous years.

Vegetative cover: The ground cover was estimated to be 85% in the area surrounding the photo point (*Hordeum leporinum* common), with a low cover of litter (10%). The canopy had a cover of 5%, and the midstorey 1%.

Weeds: *Marrubium vulgare* had not been treated, but some plants were showing signs of water stress.

Canopy trees: There were no signs of canopy dieback. Canopy trees appeared to be in good condition. European Bees occupied a hollow in the tree near the photo point.



Photo point 6 (N, E, S, W)

Photo point monitors priority weeds and eucalyptus health. During baseline survey dense infestations of the priority weed *Opuntia* sp. were recorded. Other weeds at the site included *Sisymbrium erysimoides* and *Echium plantagineum*. This community was generally in good condition with some *Callitris* regrowth and the natives *Erodium crinitum* and *Maireana* sp. were common in the ground layer.

Vegetation – general: Vegetation height was much lower than previous years. A predominantly dry winter and early spring reduced the biomass considerably from previous years. A low cover of *Hordeum leporinum* was common in 2017, and the cover of *Echium plantagineum* and *Arctotheca calendula* was very low to absent, respectively.

Vegetative cover: The ground cover was estimated to be 30% in the area surrounding the photo point, with a very high cover of litter (65%). The canopy had an estimated cover of 15% and the midstorey 1 %.

Weeds: *Opuntia* sp. had not been sprayed.

Canopy trees: There were no signs of canopy dieback. Regeneration of *Eucalyptus populnea* and *Callitris glaucophylla* were observed. Canopy trees appeared to be in good condition.

Rubbish: Rubbish had blown from the tip into the area.

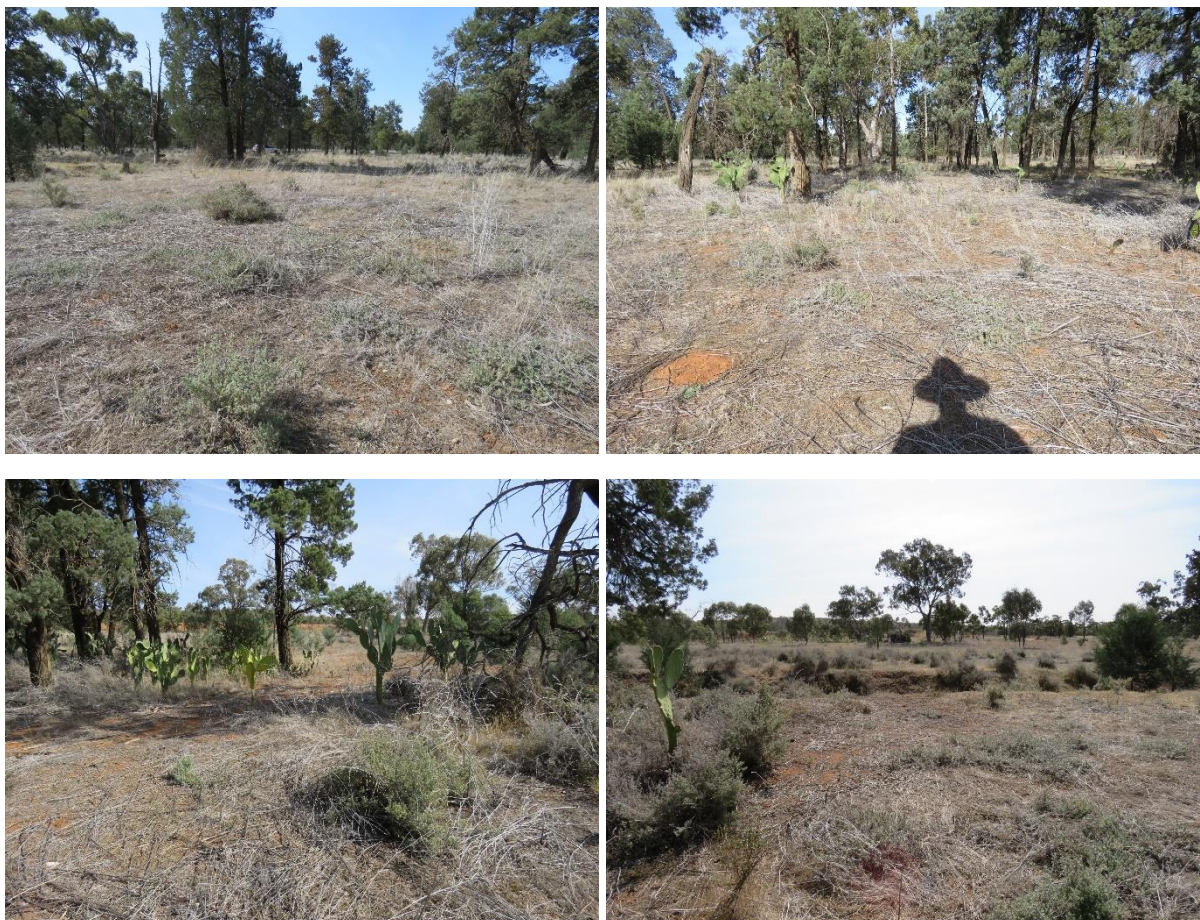


Photo point 7 (N, E, S, W)

Photo point monitors eucalyptus health and regrowth, and general woodland health. During baseline monitoring, regrowth of *Callitris* was observed but did not form a thicket, with stags present. Eucalypt regrowth was also present with minor dieback in the canopy. Foreground ground cover was predominantly native (including *Hyalosperma glutinosum*, *Triptilodiscus pygmaea*, *Maireana* sp. and *Goodenia* sp.). Few weeds were recorded but became more abundant beneath the denser stands of *Callitris* in the background.

Vegetation – general: A predominantly dry winter and early spring reduced the biomass considerably from previous years. A low cover of weeds occurred in 2017, with *Maireana* sp. and *Convolvulus erubescens* (complex) common groundcovers. Annual natives were not common.

Vegetative cover: The ground cover was estimated to be 25% in the area surrounding the photo point, with a high cover of litter (50%) and bare ground (25%). The canopy had an estimated cover of 5% and the midstorey, which was composed of regenerating canopy species, 20%.

Canopy trees: There were no signs of canopy dieback. Regeneration of *Eucalyptus populnea* and *Callitris glaucophylla* were observed. Canopy trees appeared to be in good condition.



Photo point 8 (N, E, S, W)

Photo point monitors priority weeds, perimeter track, pasture weeds and eucalypt health. During baseline survey the priority weed *Lycium ferocissimum* was recorded, with a high abundance of other weeds (*Arctotheca calendula*, *Hordeum leporinum* and *Sisymbrium erysimoides*) in the area. Eucalypts were generally healthy with no sign of dieback, except for minor dieback in advanced regrowth in the south.

Vegetation – general: Vegetation height was much lower than previous years. A predominantly dry winter and early spring reduced the biomass considerably from previous years. A high cover of *Hordeum leporinum* was present.

Vegetative cover: The ground cover was estimated to be 90% in the area surrounding the photo point, excluding the perimeter trail. The canopy had an estimate cover of 5%, with the midstorey cover approximately 1%.

Perimeter trail: The perimeter trail had been regraded since monitoring occurred in 2016.

Weeds: Contractors had sprayed *Lycium ferocissimum*, however, some plants were resprouting and require follow up treatment. *Marrubium vulgare* had not been treated.

Canopy trees: There were no signs of canopy dieback. Regeneration of *Eucalyptus populnea* and *Callitris glaucophylla* were observed. Canopy trees were in good condition.



Photo point 9 (BOA1) (N, E, S, W)

This photo point monitors Biobanking plot (BOA1) located in open woodland. During baseline survey the plot was in good condition with a high abundance and diversity of native flora (*Austrostipa scabra*, *Goodenia pusilliflora* and *Hyalosperma glutinosum*) with a low cover of weeds (24%). Low levels of dieback in eucalypt were recorded within the area. Regrowth of *Callitris* was scattered.

Vegetation – general: Below average rainfall reduced the biomass considerably from 2016. A high cover of perennial native species was present with *Austrostipa scabra* and *Rytidosperma* sp. common. The exotic grass *Vulpia* sp. was also common. Several native annual species previously recorded in higher abundance in the plot were not common, which is attributed to low rainfall (**Table 2**). A full species list is provided in **Appendix A**.

Vegetative cover: The native ground cover was approximately 56% in the biometric plot. Exotic cover decreased from 52% (2016) to 6%. The canopy and midstorey were present, but did not score along the 50 m transect.

Perimeter trail: The perimeter trail near the site had been regraded since 2016 monitoring.

Weeds: *Opuntia* sp. had not been treated.

Canopy trees: Regeneration of *Eucalyptus populnea*, *Callitris glaucophylla* and *Pittosporum angustifolium* (syn. *P. phillyraeoides*) were observed. Canopy trees were in good condition.

Rubbish: Rubbish had blown from the tip into the area.



Photo point 10 (BOA2) (N, E, S, W)

This photo point monitors Biobanking plot (BOA2) located in woodland. During baseline survey the plot had a high cover of weeds (*Bromus* sp., *Vulpia* sp., *Echium plantagineum*, and *Hypochaeris radicata*), but high diversity of native flora (*Austrostipa scabra* and *Rytidosperma* sp.). The area was generally in good health with no signs of dieback.

Vegetation – general: Vegetation height was much lower than previous years. A predominantly dry winter and early spring reduced the biomass considerably from previous years. A high cover of native species was present with *Austrostipa scabra* and *Rytidosperma* sp. common. The exotic grass *Vulpia* sp. was common. Several species previously recorded in the plot were not recorded this year, which is attributed to low rainfall. A full species list is provided in **Appendix A**.

Vegetative cover: The native ground cover was lower than 2016 with only 2% cover in the biometric plot. Exotic cover decreased from 52% (2016) to 10%.

Weeds: *Opuntia* sp. had not been treated.

Canopy trees: There were no signs of canopy dieback. Regeneration of *Callitris glaucophylla* was observed. Canopy trees appeared to be in good condition. Growth is noted in regenerating canopy species.

Rubbish: Rubbish had blown from the tip into the area.



Photo point 11 (BOA3) (N, E, S, W)

This photo point monitors Biobanking plot (BOA3) located in open woodland. During baseline survey the plot was in good condition with a high abundance and diversity of native flora (*Austrostipa scabra* and *Goodenia pusilliflora*) with a moderate cover of weeds (*Vulpia* sp. and *Arctotheca calendula*). Low levels of dieback in eucalypt and *Callitris* were recorded within the photo point and broader area.

Vegetation – general: Vegetation height was much lower than previous years. A predominantly dry winter and early spring reduced the biomass considerably from previous years. A high cover of native species was present with *Austrostipa scabra* and *Rytidosperma* sp. common. The exotic grasses *Vulpia* sp. and *Bromus* sp. were also common. Several species previously recorded in the plot were not recorded this year, which is attributed to low rainfall. A full species list is provided in **Appendix A**.

Vegetative cover: The native ground cover was higher than 2016 (29%) with 32% cover in the biometric plot. Exotic cover decreased from 78% (2016) to 10%.

Weeds: *Opuntia* sp. had not been treated.

Canopy trees: There were no signs of canopy dieback. Regeneration of *Callitris glaucophylla* and *Eucalyptus populnea* were observed. Canopy trees appeared to be in good condition.



Photo point 12 (BOA4) (N, E, S, W)

This photo point monitors Biobanking plot (BOA4) located in derived native grassland (DNG) and was a former gravel extraction pit. During baseline survey both native and exotic vegetation had re-established within the photo monitoring point (*Austrostipa scabra* and *Rytidosperma* sp. dominant), including canopy species. Priority weeds were recorded in the area, including *Opuntia* sp.

Vegetation – general: Despite a predominantly dry winter and early spring a similar (albeit fewer) number of native and exotic species were recorded to 2016 (**Table 2**). A high cover of native species was present with *Austrostipa scabra* and *Rytidosperma* sp. common. The exotic grass *Vulpia* sp. was also common. A full species list is provided in **Appendix A**.

Vegetative cover: The native ground cover was approximately 50% (the same as 2016) in the biometric plot. Exotic cover decreased from 22% (2016) to 2%.

Perimeter trail: The perimeter trail near the site had been regraded since 2016 monitoring.

Weeds: *Opuntia* sp. had not been treated.

Canopy trees: Regeneration of *Eucalyptus populnea* and *Callitris glaucophylla* were observed. Growth is noted in the regenerating canopy species from 2015.

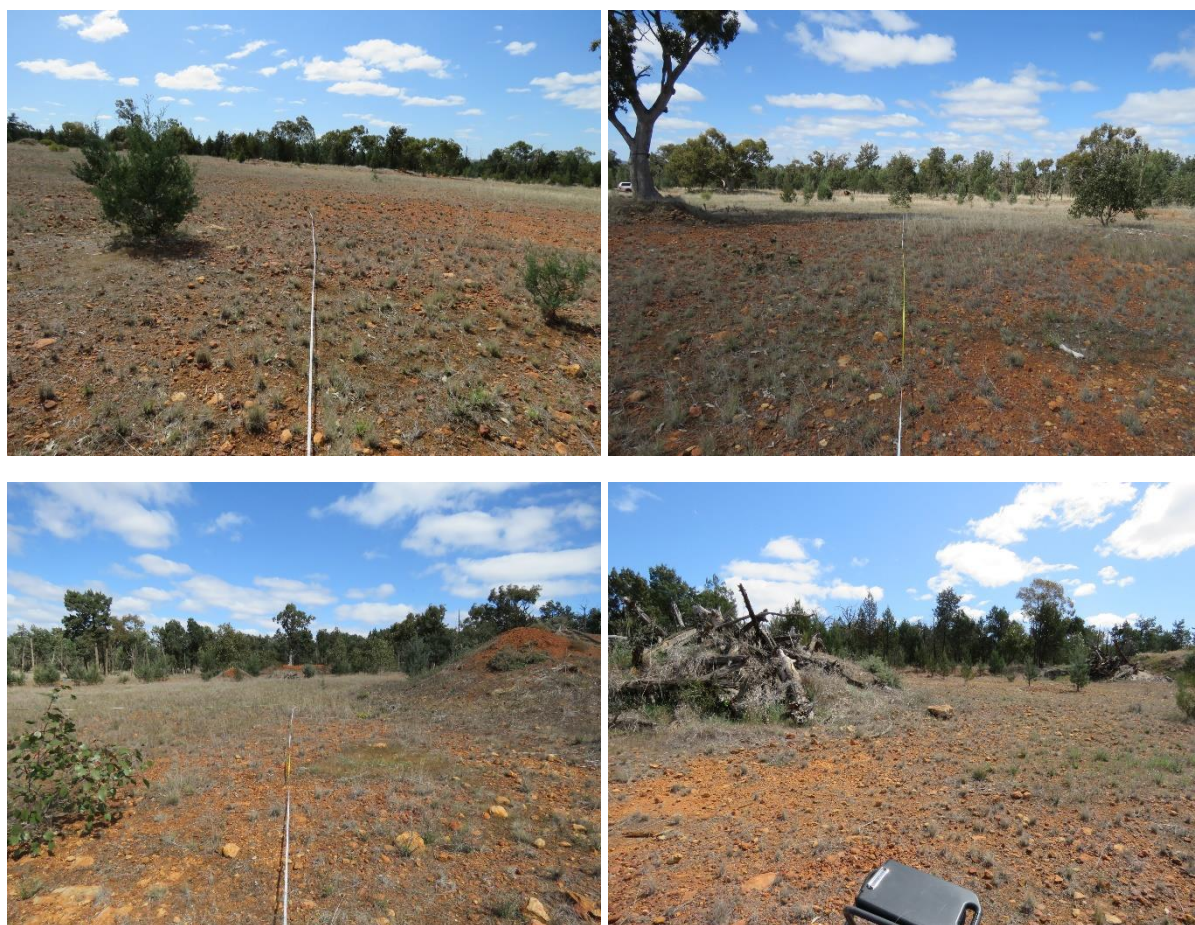


Photo point 13 (BOA5) (N, E, S, W)

This photo point monitors Biobanking plot (BOA5) located in a *Callitris* thicket. The start point is located on the edge of the thicket so that an increase in the size of the thicket to the west can be observed. During baseline survey *Callitris* were mostly low growing resulting in a “lock-up”, composed of dense *Callitris* to 4 m and 40% cover. The groundcover comprised both native and exotic species (*Austrostipa scabra*, *Cheilanthes sieberi*, *Stuartina muelleri*, *Hordeum leporinum* and *Sisymbrium erysimoides* common).

Vegetation – general: A predominantly dry winter and early spring reduced the biomass considerably from previous years. The cover of all ground cover species was estimated to be <1%, except for *Rytidosperma* sp. that had an estimated cover of 1%. Several species previously recorded in the plot were not recorded this year, which is attributed to low rainfall. A full species list is provided in **Appendix A**.

Vegetative cover: The native ground cover was much higher in 2016 (68%) with 6% ground cover in the plot in 2017. Exotic cover decreased from 42% (2016) to 4%. Midstorey cover was higher than in 2016 (**Table 2**).

Weeds: *Opuntia* sp. had not been treated.

Canopy trees: Regeneration of *Callitris glaucophylla* and *Eucalyptus populnea* were observed.

Perimeter trail: The perimeter trail near the site had been regraded since 2016 monitoring.

Rubbish: Rubbish had blown from the tip into the area.



Photo point 14 (BOA6) (N, E, S, W)

Photo point monitors Biobanking plot (BOA6) located in woodland. During baseline survey the plot had a high cover of weeds (*Arctotheca calendula*, *Bromus* sp., *Echium plantagineum* and *Medicago* sp.), but also had a high diversity of native flora (*Dichopogon fimbriatum*, *Austrostipa scabra*, *Triptilodiscus pygmaea* and *Stuartina muelleri*). The area was generally in good health with some old stags present.

Vegetation – general: Vegetation height was much lower than previous years. A predominantly dry winter and early spring reduced the biomass considerably from previous years. A high cover of native species was present with *Austrostipa scabra* and *Rytidosperma* sp. common. The exotic grasses *Vulpia* sp. and *Bromus* sp. were common. Several species previously recorded in the plot were not recorded this year, which is attributed to low rainfall. A full species list is provided in **Appendix A**.

Vegetative cover: The native ground cover was 8% cover in the plot, which is lower than 2016 (20%). Exotic cover decreased from 70% (2016) to 4%. Canopy cover was lower than 2016.

Weeds: *Opuntia* sp. had not been treated.

Canopy trees: There were no signs of canopy dieback. Regeneration of *Callitris glaucophylla* and *Eucalyptus populnea* were observed. Canopy trees appeared to be in good condition.



Table 4.1: Plant community type benchmarks and quadrat scores as at October 2017 (2016 data in brackets).

Quadrat number	Native species richness	Overstorey cover %	Mid-storey cover %	Ground cover – grasses %	Ground cover – shrubs %	Ground cover – other %	Exotic cover	Number of trees with hollows	Proportion overstorey regen.	Total length of fallen logs (m)
<i>Benchmark:</i>	>=23	14-27	33-38	5-22	0-21	0-20	N/A	>=3	1	>=33
BOA1	31 (36)	0 (0)	1 (3)	40 (32)	0 (0)	18 (40)	6 (52)	0 (0)	1 (0.33)	NR (0)
BOA2	29 (35)	1 (0)	12.1 (6.4)	2 (0)	0 (0)	0 (16)	10 (52)	0 (0)	0.5 (0.67)	NR (37)
BOA3	28 (32)	1.5 (2.1)	5 (5)	26 (22)	2 (2)	4 (24)	10 (78)	0 (0)	1 (1)	NR (5)
BOA4	21 (25)	0 (0)	2 (0.5)	34 (30)	0 (0)	16 (20)	2 (22)	0 (0)	1 (0)	NR (0)
BOA5	24 (34)	0 (0)	23 (14.5)	6 (0)	0 (0)	0 (68)	4 (42)	0 (0)	1 (0.5)	NR (1)
BOA6	24 (27)	14.5 (23.7)	4 (0)	8 (4)	0 (0)	0 (16)	4 (70)	1 (1)	1 (0)	NR (14)

5. Condition of Conservation Values

Conservation values refers to the biodiversity values of the Conservation Area and are specified in Annexure B of the Conservation Agreement.

Many of the vegetation attributes measured in a Biobanking plot were dissimilar to previous years. A prolonged period of below average rainfall is likely to attribute to lower Native Species Richness and percent cover of ground cover native species across all sites. Many annual or semi-perennial native species were either not recorded or had a much lower cover in 2017. However, they are likely to be present in the seed bank or as subterranean root-stock. Low rainfall also reduced the abundance, diversity and cover of exotic species.

One site, BOA4, dropped below benchmark for Native Species Richness. However, as a disturbed site in a state of recovery, the Native Species Richness is likely to remain around benchmark (+/- 3 species) for some time, as is likely to be within the expected fluctuation in species richness for this site. Care must be taken to ensure that inappropriate management does not cause a reduction in Native Species Richness.

Native Species Richness decreased at BOA5 (**Table 4.1**), having also decreased between 2015 and 2016. It is likely that below average rainfall is the main contributor to the decline in Native Species Richness.

High rainfall in 2016 resulted in a tall and dense ground layer, particularly of winter annuals. These grasses and forbs have died off and created a high cover of litter. A reduction in biomass is a positive change to the offset site. Prolonged periods of high cover, or an over-abundance of weeds and grass can exclude native forbs that occur in the inter-tussock spaces.

Many eucalypt canopies appeared denser in photo points in 2017. This could be a result of above average rainfall in spring 2016. Nevertheless, most sites have a canopy below benchmark condition.

Percentage cover in the midstorey continued to be below benchmark at all sites. Ground cover grass percentage exceeded benchmark at sites BOA1, BOA3 and BOA4, and was below benchmark at BOA2. Other ground cover attributes were within benchmark.

The proportion of canopy species observed to be regenerating increased. This could be due to the ground cover being much lower and more open making saplings more visible.

Several more records of *Opuntia* sp. were recorded on site. This is because the ground cover was much lower and more open than in previous years. Some *Opuntia* sp. had been treated with herbicide with limited apparent success, however, time may be required for the full effects of the treatment to be apparent.

Lycium ferocissimum was also sprayed. Several dead plants were noted, but there was some regeneration observed. A secondary treatment is required.

The 2017 survey recorded 49 species of birds within the Conservation Area during the bird surveys (**Appendix A**), plus an additional four species were recorded incidentally. Three of these species are listed under the *Biodiversity Conservation Act 2016* (Major Mitchell's Cockatoo, Superb Parrot and Grey-crowned Babbler), and four species (Chestnut-rumped

Thornbill, Red-capped Robin, Rufous Whistler and White-browed Woodswallow) that are identified as declining woodland species in south-western NSW (Reid 1999). Major Mitchell's Cockatoo, Superb Parrot, Grey-crowned Babbler, Chestnut-rumped Thornbill and Red-capped Robin were recorded in 2016.

Only one species, Common Starling, is considered a pest species. Full species list in **Appendix A**.

The 2017 survey recorded ten species of bats within the Conservation Area during the bat surveys (**Appendix A**). One of these species (Little Pied Bat) is listed as vulnerable under the *Biodiversity Conservation Act 2016*.

6. Effectiveness of Management Actions

The following management actions have been undertaken within the Conservation Area in the past twelve months.

6.1 Monitoring Biobanking monitoring plots and photos points

Monitoring of Biobanking monitoring plots and photo points was undertaken in the 2017 period. Monitoring methodology followed the management action outlined in Table 4 Annexure C Monitoring Program of the Conservation Agreement (2015) and **Table 3.1** of this report. No significant deviations from baseline monitoring occurred in the 2017 monitoring period.

6.2 Annual Reports for Monitoring Program

This Annual Monitoring Report meets the specifications in Annexure D Monitoring Program of the Conservation Agreement (2015).

6.3 Weed Management

Lycium ferocissimum (African Boxthorn) and *Opuntia* sp. (Prickly Pear) were sprayed with herbicide during the monitoring period (see **Appendix D**). A primary treatment has been conducted with mixed success. Several dead *Lycium ferocissimum* were observed, but some were resprouting (**Figure 6.1**). A secondary treatment is recommended.

Spraying was evident on *Opuntia* sp. by browning on the upper surface of the plant. Success of the treatment should be monitored to determine whether a follow up treatment is required.

No treatment of *Marrubium vulgare* (Horehound) was observed.

6.4 Pest Management

There was no evidence of Rabbits, Feral Cat or Feral Goat observed during the monitoring program. Foxes were observed on two occasions. Pest control measures have not commenced.

6.5 Fire Trail and Vehicle Access

The perimeter trail was regraded during the monitoring period. This also serves as a fire trail.

6.6 Fencing

The boundary of the offset site was fenced during the monitoring period, enclosing the western and northern boundary.

6.7 Quarterly Inspections

The offset site was inspected in February, September and December 2017. In February, grazing was considered to reduce biomass that presented a potential fire hazard. However, grazing did not occur.

The inspection in September, as part of the monitoring program, identified several small *Opuntia* sp. (Prickly Pear) across the site that were previously hidden beneath the tall ground cover. *Xanthium spinosum* (Bathurst Burr) was identified in three locations. A map illustrating the areas inspected, observations of new weeds and of treated weeds is in **Figure 6.1**.

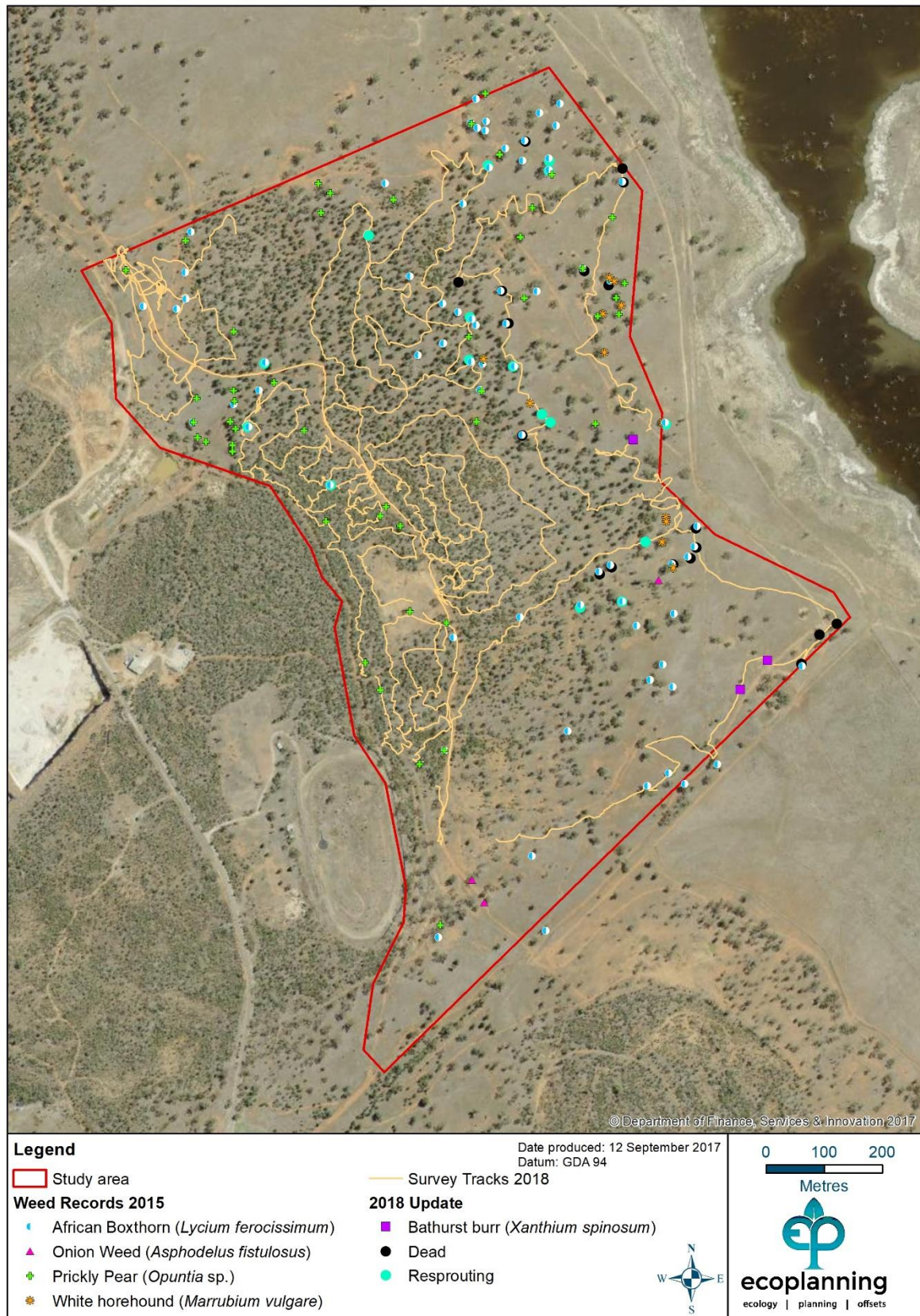


Figure 6.1: Observations of new weed records and treated weeds.

7. Recommendations

The following is recommended for the Offset site:

- Fox control is recommended for the offset site in accordance with the Conservation Agreement.
- Conduct secondary treatment for *Lycium ferocissimum* and *Opuntia* sp. as required. Consider digging out small *Opuntia* sp. rather than spraying.
- Conduct primary treatment for *Marrubium vulgare*.
- Maintain quarterly inspections to ensure grass cover does not become too dense, and introduce grazing to manage biomass, if required.

Appendix A: Species List

Biobanking plot species lists

Species Name	Common Name	BOA1		BOA2		BOA3		BOA4		BOA5		BOA6	
		2015	2017	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
Exotic species													
<i>Aira cupaniana</i>											x		x
<i>Arctotheca calendula</i>	Capeweed	x		x	x	x	x	x	x	x		x	x
<i>Avena fatua</i>	Wild Oats												
<i>Bromus rubens</i>					x		x		x				x
<i>Bromus sp.</i>			x	x	x	x	x	x	x	x	x	x	x
<i>Carthamus lanatus</i>	Saffron Thistle						x	x	x			x	
<i>Centaurea sp.</i>													
<i>Cirsium vulgare</i>	Spear Thistle									x			
<i>Echium plantagineum</i>	Patterson's Curse	x	x	x	x	x	x	x	x	x	x	x	x
<i>Erodium cicutarium</i>	Common Crowfoot					x							
<i>Hedypnois rhagadioloides</i>	Cretan Weed	x				x		x					
<i>Hordeum leporinum</i>	Barley Grass	x	x	x	x	x				x	x	x	x
<i>Hypochaeris glabra</i>		x		x	x		x					x	x
<i>Hypochaeris radicata</i>	Catsear	x	x	x	x	x	x	x	x	x	x	x	x
<i>Lactuca serriola</i>	Prickly Lettuce		x	x	x					x	x	x	
<i>Lolium rigidum</i>	Wimmera Ryegrass				x					x	x	x	x
<i>Rostratula pumila</i>	Rough-tail												
<i>Medicago laciniata</i>	Cut-leaved Medic	x	x			x	x			x		x	
<i>Medicago minima</i>	Woolly Burr Medic			x	x			x	x				
<i>Medicago polymorpha</i>	Burr Medic												
<i>Medicago truncatula</i>	Barrel Medic		x		x	x	x	x	x				
<i>Medicago sp.</i>				x						x	x	x	
<i>Moraea setifolia</i>	Thread Iris												
<i>Opuntia stricta</i>									x		x		x
<i>Opuntia sp.</i>	Prickly Pear							x					
<i>Pentaschistis airoides</i>	False Hairgrass				x								
<i>Petrorhagia nanteuilii</i>	Proliferous Pink												
<i>Polygonum aviculare</i>	Wireweed												

Species Name	Common Name	BOA1		BOA2		BOA3		BOA4		BOA5		BOA6	
		2015	2017	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
<i>Raphanus raphanistrum</i>	Wild Radish			x									
<i>Romulea rosea</i>	Onion Grass						x						
<i>Silene tridentata</i>	Catchfly							x				x	
<i>Sisymbrium erysimoides</i>	Smooth Mustard	x		x	x	x		x		x		x	
<i>Sisymbrium irio</i>	London Rocket	x		x								x	
<i>Sonchus asper</i>	Prickly Sowthistle												
<i>Sonchus oleraceus</i>	Common Sowthistle	x		x		x		x		x		x	
<i>Trifolium arvense</i>	Haresfoot Clover			x	x	x					x	x	x
<i>Trifolium glomeratum</i>	Clustered Clover				x		x				x		x
<i>Trifolium sp.</i>												x	
<i>Veronica arvensis</i>	Wall Speedwell			x		x				x			
<i>Vulpia myuros</i>	Rat's Tail Fescue												
<i>Vulpia sp.</i>		x	x	x	x	x	x	x	x	x	x	x	x
False Aira													
Unknown dead thistle											x		
Unknown grass													
Native species													
<i>Actinobole uliginosum</i>	Flannel Cudweed	x	x	x	x	x	x			x	x	x	x
<i>Aphanes australiana</i>												x	
<i>Aristida behriana</i>	Bunch Wiregrass	x	x		x	x	x		x				
<i>Arthropodium minus</i>	Small Vanilla Lily		x							x		x	x
<i>Arthropodium sp.</i>													
<i>Atriplex semibaccata</i>	Creeping Saltbush		x	x	x	x	x	x	x				
<i>Austrostipa aristiglumis</i>	Plains Grass												
<i>Austrostipa bigeniculata</i>		x	x		x	x	x						
<i>Austrostipa scabra</i>	Speargrass	x	x	x	x	x	x	x	x	x	x	x	x
<i>Austrostipa sp.</i>					x								
<i>Brachychiton populneus</i>	Kurrajong			x	x								
<i>Brachyscome lineariloba</i>	Hard-headed Daisy	x											
<i>Bulbine bulbosa</i>	Bulbine Lily	x		x			x	x		x		x	

Species Name	Common Name	BOA1		BOA2		BOA3		BOA4		BOA5		BOA6	
		2015	2017	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
<i>Bulbine semibarbata</i>										x			
<i>Calandrinia eremaea</i>				x						x		x	
<i>Callitris glaucophylla</i>	White Cypress Pine	x	x	x	x	x	x	x	x	x	x	x	x
<i>Calotis hispidula</i>	Bogan Flea	x		x	x	x	x			x	x	x	
<i>Cassia artemisioides</i>				x									
<i>Cassia</i> sp.													
<i>Chamaesyce drummondii</i>	Caustic Weed												
<i>Cheilanthes sieberi</i>	Mulga Fern	x	x	x	x	x	x			x	x	x	x
<i>Chenopodium desertorum</i>													x
<i>Chenopodium nitrariaceum</i>	Nitre Goosefoot												
<i>Chenopodium</i> sp.												x	
<i>Chloris</i> sp.		x	x	x		x	x			x	x		
<i>Chloris truncata</i>	Windmill Grass												
<i>Chrysocephalum apiculatum</i>	Common Everlasting	x	x			x	x	x	x	x	x		
<i>Convolvulus erubescens</i> complex					x		x		x				
<i>Convolvulus</i> sp.								x					
<i>Crassula colorata</i>			x								x		x
<i>Crassula decumbens</i>												x	
<i>Crassula</i> sp.		x		x		x				x		x	
<i>Dianella</i> sp.		x	x										
<i>Dichelachne</i> sp.										x		x	
<i>Dichopogon fimbriatum</i>	Chocolate Lily		x		x		x				x		x
<i>Dichopogon</i> sp.		x		x		x				x		x	
<i>Einadia nutans</i>	Climbing Saltbush	x	x			x	x		x	x	x	x	x
<i>Einadia nutans</i> subsp. <i>nutans</i>		x		x									
<i>Enchylaena tomentosa</i>	Ruby Saltbush	x	x	x	x			x	x		x	x	x
<i>Erodium crinitum</i>	Blue Storksbill	x	x	x	x	x	x	x		x		x	x
<i>Eucalyptus populnea</i>	Poplar Box	x	x				x	x	x		x	x	x
<i>Euphorbia</i> sp.										x			
<i>Goodenia cycloptera</i>		x	x										
<i>Goodenia fascicularis</i>													
<i>Goodenia pusilliflora</i>		x	x	x	x	x	x	x	x	x		x	x
<i>Hyalosperma glutinosum</i> subsp. <i>glutinosum</i>			x		x		x		x				x

Species Name	Common Name	BOA1		BOA2		BOA3		BOA4		BOA5		BOA6	
		2015	2017	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
<i>Hyalosperma semisterile</i>		x		x	x	x		x					
<i>Hyalosperma</i> sp.										x			
<i>Hyalosperma</i> sp. 2		x								x		x	
<i>Hypoxis</i> sp.													
<i>Isoetopsis graminifolia</i>	Grass Cushion	x		x		x		x		x		x	
<i>Maireana enchylaenoides</i>	Wingless Fissure Weed	x	x	x	x	x	x	x		x	x	x	x
<i>Maireana excavata</i>	Bottle Bluebush	x	x	x	x	x	x		x			x	x
<i>Millotia myosotidifolia</i>	Broad-leaved Millotia									x			
<i>Minuria leptophylla</i>								x	x				
<i>Ophioglossum lusitanicum</i>	Adders Tongue	x		x									
<i>Ophioglossum</i> sp.						x							
<i>Oxalis perennans</i>		x		x	x	x			x	x	x	x	x
<i>Pittosporum angustifolium</i>		x	x										
<i>Pterostylis bicolor</i>	Black-tip Greenhood									x			
<i>Ptilotus spathulatus</i>	Pussy Tails	x	x					x	x				
<i>Ranunculus sessiliflorus</i>				x								x	
<i>Rhodanthe corymbiflora</i>	Small White Sunray												
<i>Rhodanthe diffusa</i>				x		x							
<i>Rhodanthe pygmaea</i>	Pygmy Sunray	x		x		x	x	x					
<i>Rytidosperma</i> sp.		x	x	x	x	x	x	x	x	x	x	x	x
<i>Rytidosperma</i> sp.2													
<i>Salsola australis</i> (syn. <i>S. kali</i> and <i>S. tragus</i>)	Soft Roly Poly	x	x	x	x			x	x				
<i>Sclerolaena</i> sp.													
<i>Sida corrugata</i>	Corrugated Sida	x	x	x	x	x	x	x	x	x	x	x	x
<i>Sida cunninghamii</i>	Ridged Sida	x	x	x	x	x	x	x	x	x	x	x	x
<i>Solanum esuriale</i>	Quena					x	x		x				
<i>Solanum</i> sp.					x								
<i>Spergularia</i> sp.										x			
<i>Stackhousia monogyna</i>	Creamy Stackhousia			x	x	x				x	x		
<i>Stuartina muelleri</i>	Spoon Cudweed			x		x				x	x	x	

Species Name	Common Name	BOA1		BOA2		BOA3		BOA4		BOA5		BOA6	
		2015	2017	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
<i>Thysanotus patersonii</i>	Twining Fringe Lily									x			
<i>Tricoryne elatior</i>	Yellow Autumn-lily				x	x	x						x
<i>Triptilodiscus pygmaeus</i>	Common sunray	x		x		x	x			x	x	x	x
<i>Velleia paradoxa</i>	Spur Velleia												
<i>Vittadinia cuneata</i>	Fuzzweed		x	x	x	x	x	x	x		x	x	x
<i>Wahlenbergia communis</i>	Tufted Bluebell												
<i>Wahlenbergia</i> sp.		x		x						x	x	x	
<i>Wahlenbergia</i> sp. (broad leaf)						x							
<i>Walwhalleya proluta</i>													
<i>Wurmbea dioica</i>	Early Nancy			x									
<i>Xerochrysum bracteatum</i>	Golden Everlasting		x	x	x	x			x	x	x	x	x
Unknown grass										x	x		

Bird survey species list 2017

Species Name	Common Name	TSC Act Listing	EPBC Act Listing	BOA2	BOA3	BOA4	BOA5	BOA6	Bird 6
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater			x		x	x	x	x
<i>Acanthiza apicalis</i>	Inland Thornbill						x		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill					x	x		
<i>Acanthiza nana</i>	Yellow Thornbill			x		x	x		
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill			x		x	x		
<i>Aquila audax</i>	Wedge-tailed Eagle				x				
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow					x	x	x	
<i>Artamus superciliosus</i>	White-browed Woodswallow			x		x		x	
<i>Barnardius zonarius</i>	Australian Ringneck			x	x	x	x	x	x
<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo	V			x				
<i>Chroicocephalus novaehollandiae</i>	Silver Gull			x			x	x	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike			x		x	x		
<i>Corcorax melanorhamphos</i>	White-winged Chough			x		x	x		x
<i>Corvus bennetti</i>	Little Crow			x	x	x	x	x	x
<i>Corvus coronoides</i>	Australian Raven			x	x	x	x	x	x
<i>Cracticus nigrogularis</i>	Pied Butcherbird			x	x	x		x	x
<i>Cracticus tibicen</i>	Magpie			x	x	x	x	x	x
<i>Cracticus torquatus</i>	Grey Butcherbird			x	x	x	x	x	x
<i>Eolophus roseicapilla</i>	Galah			x	x	x	x	x	
<i>Falco berigora</i>	Brown Falcon				x				x
<i>Falco cenchroides</i>	Nankeen Kestrel					x			x
<i>Geopelia placida</i>	Peaceful Dove			x	x	x	x		
<i>Gerygone fusca</i>	Western Gerygone						x	x	
<i>Grallina cyanoleuca</i>	Magpie Lark			x	x	x	x	x	x
<i>Haliastur sphenurus</i>	Whistling Kite			x		x	x	x	

Species Name	Common Name	TSC Act Listing	EPBC Act Listing	BOA2	BOA3	BOA4	BOA5	BOA6	Bird 6
<i>Manorina flavigula</i>	Yellow-throated Miner			x	x	x	x	x	x
<i>Milvus migrans</i>	Black Kite			x	x	x	x	x	x
<i>Northiella haematogaster</i>	Blue Bonnet			x	x	x		x	x
<i>Nymphicus hollandicus</i>	Cockatiel			x	x	x	x	x	
<i>Ocyphaps lophotes</i>	Crested Pigeon			x	x	x	x	x	x
<i>Pachycephala rufiventris</i>	Rufous Whistler						x	x	
<i>Pardalotus striatus</i>	Straited Pardalote			x	x	x	x		x
<i>Pelecanus conspicillatus</i>	Australian Pelican					x			
<i>Petrochelidon nigricans</i>	Tree Martin			x	x	x	x	x	x
<i>Petroica goodenovii</i>	Red-capped Robin					x	x		
<i>Phalacrocorax carbo</i>	Black Cormorant							x	
<i>Phaps chalcoptera</i>	Common Bronzewing					x			x
<i>Polytelis swainsonii</i>	Superb Parrot	V	V		x				
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	V		x	x	x	x	x	x
<i>Psephotus haematonotus</i>	Red-rumped Parrot			x	x	x	x	x	x
<i>Rhipidura albiscapa</i>	Grey Fantail			x		x	x	x	
<i>Rhipidura leucophrys</i>	Willie Wagtail			x	x	x	x	x	x
<i>Smicromis brevirostris</i>	Weebil			x		x	x	x	x
<i>Struthidea cinerea</i>	Apostlebird			x				x	x
<i>Sturnus vulgaris</i>	Starling			x	x	x		x	x
<i>Taeniopygia bichenovii</i>	Double-barred Finch						x		
<i>Threskiornis moluccus</i>	White Ibis					x	x		x
<i>Todiramphus sanctus</i>	Sacred Kingfisher					x			
<i>Zosterops lateralis</i>	Silvereye					x	x		

Bat survey species list 2017

Species Name	Common Name	TSC Act Listing	EPBC Act Listing	2016	2017
<i>Austronomus australis</i>	White-striped Freetail Bat			X	
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat			X	X
<i>Chalinolobus morio</i>	Chocolate Wattled bat			X	X
<i>Chalinolobus picatus</i>	Little Pied Bat	V		X	X
<i>Mormopterus (Ozimops) kitcheneri</i>	South-western Freetail Bat			X	
<i>Mormopterus (Ozimops) petersi</i>	Inland Freetail Bat			X	X
<i>Mormopterus (Ozimops) planiceps</i>	South-eastern Freetail Bat				X
<i>Nyctophilus</i> sp.	Long-eared Bat			X	X
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat			X	X
<i>Scotorepens greyii</i>	Little Broad-nosed Bat			X	X
<i>Vespadelus baverstocki</i>	Inland Forest Bat	V		X	
<i>Vespadelus darlingtoni</i>	Large Forest Bat				X
<i>Vespadelus regulus</i>	Southern Forest Bat			Possible	
<i>Vespadelus vulturnus</i>	Little Forest Bat			X	X

Appendix B: Completed Monitoring Data Sheets (including photos)

Photo Point 1

Monitoring Data Sheet			
Monitoring Point Number	PP1	Date	18/9/17
1. Site Photo(s)	1595 — 1598		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		—	
Midstorey:		—	
Groundcover(grass):		total cover exotic/Native 9%	
Groundcover (shrub):		Maizeana	
Groundcover (other):			
Native species richness:			
Proportion of canopy species regenerating			
Exotic cover		Barley	
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			nil
Threatened species sightings			nil
Fire event/fuel/fire breaks			fire trail cut on N boundary
Weeds			moderate cover of weeds but dry veg.
Pest animals			nil
Visitor impact/vehicles			Nil
Rubbish dumping			Nil
Erosion			old drainage line No active erosion
Fencing			Nil

Photo Point 1 (N, E, S, W)



Photo Point 2

Monitoring Data Sheet			
Monitoring Point Number	PP2	Date	18/9/17
1. Site Photo(s)	1650 - 1653		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		15%	
Midstorey:		5% - cypress regen + shrub.	
Groundcover (grass):			
Groundcover (shrub):			
Groundcover (other):			
Native species richness:			
Proportion of canopy species regenerating			
Exotic cover			
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress regen
Threatened species sightings			Nil
Fire event/fuel/fire breaks			Trail
Weeds			Hordeum Opuntia
Pest animals			Nil
Visitor impact/vehicles			Trail
Rubbish dumping			Nil
Erosion			Nil
Fencing			Nil

Ground cover 20%, Litter - 40%^{crypt}, bare 10%.

Photo Point 2 (W, N, E, S)



Photo Point 3

Monitoring Data Sheet			
Monitoring Point Number	PP3	Date	18/9/17
1. Site Photo(s)	1607 - 1610 (N-W)		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		5%	
Midstorey:		P/b.	
Groundcover (grass):			
Groundcover (shrub):			
Groundcover (other):			
Native species richness:			
Proportion of canopy species regenerating			
Exotic cover		High cover of weeds	
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Bimil box regen
Threatened species sightings			Nil
Fire event/fuel/fire breaks			Nil
Weeds			Boxthorn, horehound, weedy grasses + herbs. Boxthorn sprayed but 1 resprouting - follow-up req
Pest animals			Nil
Visitor impact/vehicles			Nil
Rubbish dumping			Nil
Erosion			Nil
Fencing			Nil

Fallen litter abundant
 Ground cover ~ 30%, litter 65%, bare 5%

Photo Point 3 (E, S, W, N)



Photo Point 4

Monitoring Data Sheet			
Monitoring Point Number	PP4	Date	18/9/17
1. Site Photo(s)	1603-1606 (N-W)		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		100%	
Midstorey:			
Groundcover(grass):		High litter cover	
Groundcover (shrub):			
Groundcover (other):			
Native species richness:			
Proportion of canopy species regenerating			
Exotic cover		Grassy weeds, horsehoand, Borkhorn	
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress reger
Threatened species sightings			GCB
Fire event/fuel/fire breaks			Nil
Weeds			Horsehoand, Borkhorn, Hordenum - top of Borkhorn dead - sprayed?
Pest animals			Nil ↳ Follow up requy
Visitor impact/vehicles			Nil
Rubbish dumping			Nil
Erosion			Nil
Fencing			Nil

Overall 50% G/cowr, 45% litter, 5% bare

Photo Point 4 (E, S, W, N)



Photo Point 5

No cap

Monitoring Data Sheet			
Monitoring Point Number	115	Date	18/9/17
1. Site Photo(s)	1599 - 1602 (N-W)		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		10%	
Midstorey:		17%	
Groundcover(grass):		Total cover 85% + 10% 1. Her	
Groundcover (shrub):			
Groundcover (other):			
Native species richness:			
Proportion of canopy species regenerating			
Exotic cover		Horehound - 10% high grass cover	
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress regen Bimble Box regen
Threatened species sightings			Nil
Fire event/fuel/fire breaks			Nil
Weeds			Horehound
Pest animals			European bee hive in tree
Visitor impact/vehicles			Nil
Rubbish dumping			Nil
Erosion			Nil
Fencing			Nil

Some water stress in horehound
very dry veg

Photo Point 5 (N, E, S, W)



Photo Point 6

Monitoring Data Sheet			
Monitoring Point Number	PP6	Date	18/9/17
1. Site Photo(s)	1631 — 1634		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		15%	
Midstorey:		1%	
Groundcover(grass):			
Groundcover (shrub):			
Groundcover (other):			
Native species richness:			
Proportion of canopy species regenerating		2/2	
Exotic cover			
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress regen Bumble bee regen
Threatened species sightings			Nil
Fire event/fuel/fire breaks			Nil - trail nearby
Weeds			Opuntia
Pest animals			Nil -
Visitor impact/vehicles			Nil
Rubbish dumping			Blown rubbish from tip
Erosion			Nil
Fencing			Nil

Very dry

Ground cover, 30% litter 65% bare 5%

Photo Point 6 (N, E, S, W)



Photo Point 7

Monitoring Data Sheet			
Monitoring Point Number	PP7	Date	18/9/17
1. Site Photo(s)	1658-1661		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		5%	
Midstorey:		20%	
Groundcover(grass):			
Groundcover (shrub):		Stipa	
Groundcover (other):		Maureana, Conio, c	
Native species richness:			
Proportion of canopy species regenerating		212	
Exotic cover			
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress + Bimble regen
Threatened species sightings			Nil
Fire event/fuel/fire breaks			Nil
Weeds			low weed cover, Medicago
Pest animals			Nil
Visitor impact/vehicles			Nil
Rubbish dumping			Nil
Erosion			Nil
Fencing			Nil

Ground cover 25%, litter 50%, bare/crypt 25%
Very dry

Photo Point 7 (N, E, S, W)



Photo Point 8

Monitoring Data Sheet			
Monitoring Point Number	PP 8	Date	18/9/17
1. Site Photo(s)	1654-1657		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		50%	
Midstorey:		10%	
Groundcover(grass):			
Groundcover (shrub):			
Groundcover (other):			
Native species richness:			
Proportion of canopy species regenerating		2/2	
Exotic cover			
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress reg Bottle reg
Threatened species sightings			Nil
Fire event/fuel/fire breaks			Trail
Weeds			Cycum been sprayed - fallen up edge High weed cover. Hordern
Pest animals			Nil
Visitor impact/vehicles			Nil
Rubbish dumping			Nil
Erosion			Nil
Fencing			Boundary fence intact

Ground cover 90% , litter 10% , bare (road not counted)

Photo Point 8 (N, E, S, W)



BOA1

Monitoring Data Sheet			
Monitoring Point Number	BOA 1	Date	20/9/17
1. Site Photo(s)	1781 — 1785 (end, down L, B, L)		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		0 0 0 0 0 0 0 0 0 0	
Midstorey:		0 0 0 0 10 0 0 0 0 0	
Groundcover(grass):		40	
Groundcover (shrub):		0	
Groundcover (other):		18	
Native species richness:		0	
Proportion of canopy species regenerating			
Exotic cover		L	
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Pittosporum Cypress Bumble box
Threatened species sightings			Nil
Fire event/fuel/fire breaks			Trail
Weeds			Opuntia
Pest animals			Nil - Fox nearby spotted 19/9
Visitor impact/vehicles			Trail
Rubbish dumping			blew rubbish from tip
Erosion			Nil
Fencing			Nil

26 Litter : ||| ||| |||

6 Crypto : |||

6 Bare : |||

very dry.

BOA1 (N, E, S, W)



BOA2

Monitoring Data Sheet			
Monitoring Point Number	BOA 2		Date
1. Site Photo(s)		1800 - 1803 (F, R, B, L) 1804 (end)	
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		0 0 0 0 0 0 0 0 0 10	
Midstorey:		0 5 5 0 20 1 10 10 0 70	
Groundcover (grass):		1	
Groundcover (shrub):			
Groundcover (other):			
Native species richness:			
Proportion of canopy species regenerating			
Exotic cover		III	
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress
Threatened species sightings			Red capped Robin nearby
Fire event/fuel/fire breaks			Nul
Weeds			Opuntia nearby
Pest animals			Nul
Visitor impact/vehicles			Nul
Rubbish dumping			Blown rubbish from tip
Erosion			Nul
Fencing			Nul

Letter: IIII IIII IIII IIII IIII IIII IIII II
 Crypto: IIII
 Bare: II

BOA2 (N, E, S, W)



BOA3

Monitoring Data Sheet				
Monitoring Point Number	BOA3		Date	19/9/7
1. Site Photo(s)	1669 — 1673 (1670-1673 at PP)			
2. Floristic BioMetric attributes				
Native cover				
Overstorey:				0. 0 0 0 0 5 5 5 0 0 ^{dead}
Midstorey:				40 0 0 0 0 0 10- 0 0 0
Groundcover(grass):				
Groundcover (shrub):				1 /
Groundcover (other):				
Native species richness:				
Proportion of canopy species regenerating				2/2
Exotic cover				
3. Opportunistic observations	GPS coordinates	Photo number	Observations	
Natural regeneration of disturbed areas			Cypress + Bimble regen	
Threatened species sightings			Nil	
Fire event/fuel/fire breaks			Nil	
Weeds			Vulpia, Hypochaeris	
Pest animals			Nil	
Visitor impact/vehicles			Nil	
Rubbish dumping			Nil	
Erosion			Nil	
Fencing			Nil	

Litter: ||| ||| ||| |||

Crypt: ||| |||

Bare: ||| ||

BOA3 (N, E, S, W)

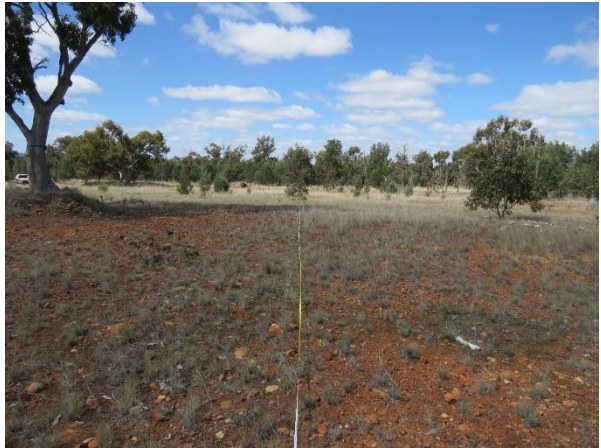


BOA4

Monitoring Data Sheet			
Monitoring Point Number	BOA 4	Date	19/9/17
1. Site Photo(s)	1689 - 1692 (L, Forward, R, Back), 1693 end.		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		0 0 0 0 0 0 0 0 0 0	
Midstorey:		0 0 0 0 0 0 20 0 0 0	
Groundcover(grass):		HHH HHH HHH II	
Groundcover (shrub):			
Groundcover (other):		HHH III	
Native species richness:			
Proportion of canopy species regenerating		2/2	
Exotic cover		1	
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress + Bimble
Threatened species sightings			Red-capped Robin, GCB
Fire event/fuel/fire breaks			Trail
Weeds			Opuntia
Pest animals			Nil
Visitor impact/vehicles			Trail
Rubbish dumping			Nil
Erosion			Nil
Fencing			Nil

Litter: HHH
 crypts: HHH 1
 Bare: HHH HHH IIII

BOA4 (N, E, S, W)



BOA5

Monitoring Data Sheet			
Monitoring Point Number	BOA5	Date	20/9/17
1. Site Photo(s)	1805 - 1808 (F, E, L, B) 1809 (end)		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:		0 0 0 0 0 0 0 0 0 0	
Midstorey:		15 20 20 30 50 30 60 0 50	
Groundcover(grass):		6 III	
Groundcover (shrub):			
Groundcover (other):			
Native species richness:			
Proportion of canopy species regenerating		2/2	
Exotic cover		4 II	
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress Bimble box
Threatened species sightings			Red capped robin
Fire event/fuel/fire breaks			Trail
Weeds			Opuntia
Pest animals			Nil
Visitor impact/vehicles			Trail
Rubbish dumping			Blown rubbish from tip
Erosion			Nil
Fencing			Nil

Letter : IIII IIII IIII IIII IIII IIII I

Crypto : IIII

Bare : IIII

BOA5 (N, E, S, W)



BOA6

Monitoring Data Sheet			
Monitoring Point Number	BOA 6	Date	19/9/17
1. Site Photo(s)	1684 — 1688 (end, down, L, L, Back)		
2. Floristic BioMetric attributes			
Native cover			
Overstorey:	5 40 10 30 40 10 10 0 0 0		
Midstorey:	0 0 0 0 5 0 5 0 10 20		
Groundcover(grass):	8	1111	
Groundcover (shrub):	0		
Groundcover (other):	0		
Native species richness:			
Proportion of canopy species regenerating		212	
Exotic cover		4	11
3. Opportunistic observations	GPS coordinates	Photo number	Observations
Natural regeneration of disturbed areas			Cypress Bumble Bee
Threatened species sightings			Nil
Fire event/fuel/fire breaks			Nil
Weeds			Opuntia
Pest animals			Nil
Visitor impact/vehicles			Nil
Rubbish dumping			Nil
Erosion			Nil
Fencing			Nil

Letter : IIII IIII IIII IIII IIII IIII IIII
 Crypt : IIII III
 Bare : III

BOA6 (N, E, S, W)



Appendix C: Completed Quadrat Data Sheets

Species Name	Common Name	BOA 1	BOA2	BOA3	BOA4	BOA5	BOA6
Exotics							
<i>Aira cupaniana</i>						✓ <1 1000	✓ <1 50
<i>Arctotheca calendula</i>	Capeweed		✓ <1 50	✓ <1 20	✓ <1 50		✓ <1 50
<i>Avena fatua</i>	Wild Oats						
<i>Bromus rubens</i>			✓ 1 1000	✓ 3 500	✓ <1 500		✓ <1 500
<i>Bromus</i> sp.		✓ 1 1000	✓ 1 1000	✓ <1 10	✓ <1 100	✓ <1 500	✓ <1 100
<i>Carthamus lanatus</i>	Saffron Thistle			✓ <1 1	✓ <1 100		
<i>Centaurea</i> sp.							
<i>Cirsium vulgare</i>	Spear Thistle						
<i>Echium plantagineum</i>	Paterson's Curse	✓ <1 500	✓ <1 1000	✓ <1 500	✓ <1 50	✓ <1 100	✓ 1 1000
<i>Erodium cicutarium</i>	Common Crowfoot						
<i>Hedypnois rhagadioloides</i>							
<i>Hordeum leporinum</i>	Barley Grass	✓ <1 50	✓ <1 1000			✓ <1 500	✓ 1 1000
<i>Hypochaeris glabra</i>			✓ <1 50	✓ <1 500			✓ <1 1000
<i>Hypochaeris radicata</i>	Catsear	✓ <1 500	✓ <1 1000	✓ <1 10	✓ <1 500	✓ <1 100	✓ <1 100
<i>Iris</i> sp.							
<i>Lactuca serriola</i>	Prickly Lettuce	✓ <1 50	✓ <1 50			✓ <1 1	
<i>Lepidium</i> sp.							
<i>Lolium rigidum</i>	Wimmera Ryegrass		✓ <1 50			✓ <1 20	✓ <1 50
<i>Rostratula pumila</i>							
<i>Medicago laciniata</i>	Cut-leaved Medic	✓ <1 100		✓ <1 50			
<i>Medicago minima</i>	Woolly Burr Medic		✓ <1 100		✓ <1 10		
<i>Medicago polymorpha</i>	Burr Medic						
<i>Medicago</i> sp.						✓ <1 20	
<i>Medicago truncatula</i>	Barrel Medic	✓ <1 10	✓ <1 100	✓ <1 50	✓ <1 50		
<i>Opuntia stricta</i>	Prickly Pear				✓ <1 7	✓ <1 2	✓ <1 1

Barn Owl
Bar-shouldered Dove

Species Name	Common Name	BOA 1	BOA2	BOA3	BOA4	BOA5	BOA6
<i>Opuntia</i> sp.							
<i>Pentstemon</i> <i>airoides</i>	False Hairgrass		✓ < 1 1				
<i>Polygonum</i> <i>aviculare</i>	Wireweed						
<i>Raphanus</i> <i>raphanistrum</i>	Wild Radish						
<i>Silene</i> <i>tridentata</i>	Catchfly						
<i>Sisymbrium</i> <i>erysimoides</i>			✓? < 1 5				
<i>Sisymbrium</i> <i>irio</i>	London Rocket						
<i>Sonchus</i> <i>asper</i>	Prickly Sowthistle						
<i>Sonchus</i> <i>oleraceus</i>	Common Sowthistle						
<i>Trifolium</i> <i>arvense</i>	Haresfoot Clover		✓ < 1 50			✓ < 1 500	✓ < 1 10
<i>Trifolium</i> sp.							
<i>Veronica</i> <i>arvensis</i>							
<i>Vulpia</i> <i>myuros</i>	Rat's Tail Fescue						
<i>Vulpia</i> sp.		✓ 5 5000	✓ 5 5000	✓ 5 5000	✓ 1 5000	✓ < 1 500	✓ 2 5000
Natives							
<i>Actinobole</i> <i>uliginosum</i>	Flannel Cudweed	✓ < 1 100	✓ < 1 100	✓ < 1 50		✓ < 1 5000	✓ < 1 100 dead
<i>Aphanes</i> <i>australiana</i>							
<i>Aristida</i> <i>behriana</i>	Bunch Wiregrass	✓ < 1 20	✓ < 1 50	✓ < 1 1	✓ < 1 20		
<i>Arthropodium</i> <i>minus</i>	Small Vanilla Lily	✓ < 1 5					? < 1 10
<i>Arthropodium</i> sp.							
<i>Atriplex</i> <i>semibaccata</i>	Creeping Saltbush	✓ < 1 5	✓ < 1 1	✓ < 1 10	✓ < 1 5		
<i>Atriplex</i> sp.							
<i>Austrostipa</i> <i>aristiglumis</i>	Plains Grass						
<i>Austrostipa</i> <i>bigeniculata</i>		✓ < 1 20	✓ < 1 10	✓ 1 1000			
<i>Austrostipa</i> <i>scabra</i>	Speargrass	✓ 15 1000	✓ 2 500	✓ 10 1000	✓ 5 1000	✓ 1 500	✓ 10 1000
<i>Austrostipa</i> sp.			✓ < 1 20				

Species Name	Common Name	BOA 1	BOA2	BOA3	BOA4	BOA5	BOA6
<i>Brachychiton populneus</i>	Kurrajong		✓ 1 1				
<i>Brachyscome lineariloba</i>	Hard-headed Daisy						
<i>Bulbine bulbosa</i>	Bulbine Lily			✓ 1 1			
<i>Bulbine semibarbata</i>							
<i>Calandrinia eremaea</i>							
<i>Callitris glaucophylla</i>	White Cypress Pine	✓ 10 3	✓ 10 20	✓ 1 3	✓ 1 2	✓ 30 500	✓ 1 1
<i>Calotis hispidula</i>	Bogan Flea		✓ 1 1	✓ 1 100		✓ 1 1	
<i>Cassia artemisioides</i>							
<i>Cassia</i> sp.							
<i>Chamaesyce drummondii</i>	Caustic Weed						
<i>Cheilanthes sieberi</i>	Mulga Fern	✓ 1 10	✓ 1 100	✓ 1 100		✓ 1 100	✓ 1 100
<i>Chenopodium desertorum</i> subsp. <i>desertorum</i>							✓ 1 3
<i>Chenopodium nitriaceum</i>	Nitre Goosefoot						
<i>Chenopodium</i> sp.							
<i>Chloris</i> sp.		✓ 1 20		✓ 1 1000		✓ 1 20	
<i>Chloris truncata</i>	Windmill Grass						
<i>Chrysocephalum apiculatum</i>	Common Everlasting	✓ 1 1		✓ 1 5	✓ 1 2	✓ 1 5	
<i>Convolvulus erubescens</i> complex			✓ 1 1	✓ 1 1	✓ 1 100		
<i>Convolvulus</i> sp.							
<i>Crassula colorata</i>		✓ 1 1				✓ 1 50	✓ 1 10
<i>Crassula decumbens</i> var <i>decumbens</i>							
<i>Crassula</i> sp.		✓ 1 5					
<i>Dianella</i> sp.		? <i>W. leucantha</i> ?					
<i>Dichelachne</i> sp.							
<i>Dichopogon fimbriatum</i>	Chocolate Lily	✓ 1 500	✓ 1 100	✓ 1 1000		✓ 1 1000	✓ 1 1000

Species Name	Common Name	BOA 1	BOA2	BOA3	BOA4	BOA5	BOA6
<i>Dichopogon</i> sp.							
<i>Einadia nutans</i>	Climbing Saltbush	✓ <1 2		✓ <1 1	✓ <1 2	✓ <1 5	✓ <1 1
<i>Einadia nutans</i> subsp. <i>nutans</i>							
<i>Enchylaena tomentosa</i>	Ruby Saltbush	✓ <1 2	✓ <1 10		✓ <1 10	✓ <1 5	✓ <1 5
<i>Erodium crinitum</i>	Blue Storksbill	✓ <1 100	✓ <1 100	✓ <1 100			✓ <1 500
<i>Eucalyptus populnea</i>	Poplar Box	✓ <1 1		✓ <1 1	✓ <1 2	✓ <1 1	✓ <1 1
<i>Euphorbia</i> sp.							
<i>Goodenia cycloptera</i>		✓ <1 50					
<i>Goodenia fascicularis</i>							
<i>Goodenia pusilliflora</i>		✓ <1 500	✓ <1 100	✓ <1 500	✓ 1 5000		✓ <1 50
<i>Homopholis prolata</i>							
<i>Hyalosperma glutinosum</i> subsp. <i>glutinosum</i>		✓ <1 100	✓ <1 10	✓ <1 100	✓ <1 500		✓ <1 2
<i>Hyalosperma semisterile</i>			✓ <1 1				
<i>Hyalosperma</i> sp.							
<i>Isoetopsis graminifolia</i>	Grass Cushion						
<i>Maireana enchylaenoides</i>	Wingless Fissure Weed	✓ <1 10	✓ <1 10	✓ <1 1		✓ <1 50	✓ <1 50
<i>Maireana excavata</i>		✓ 1 500	✓ <1 10	✓ <1 100	✓ <1 10		✓ <1 2
<i>Millotia myosotidifolia</i>							
<i>Minuria leptophylla</i>					✓ <1 20		
<i>Ophioglossum lusitanicum</i>	Adders Tongue						
<i>Ophioglossum</i> sp.							
<i>Oxalis perennans</i>			✓ <1 10		✓ <1 10	✓ <1 50	✓ <1 20
<i>Pittosporum phylliraeoides</i>		✓ <1 10					
<i>Pterostylis bicolor</i>	Black-tip Greenhood						
<i>Ptilotus spathulatus</i>	Pussy Tails	✓ <1 2			✓ <1 3		
<i>Ranunculus sessiliflorus</i>							

Species Name	Common Name	BOA 1	BOA2	BOA3	BOA4	BOA5	BOA6
<i>Rhodanthe corymbiflora</i>	Small White Sunray						
<i>Rhodanthe diffusa</i>							
<i>Rhodanthe pygmaea</i>	Pygmy Sunray			✓ <1 10			
<i>Rytidosperma</i> sp.		✓ 5 500	✓ 5 500	✓ 5 1000	✓ 5 1000	✓ 1 500	✓ 5 1000
<i>Salsola australis</i> (formerly <i>S. kali</i> and <i>S. tragus</i>)	Soft Roly Poly	✓ <1 1	✓ <1 2		✓ <1 10		
<i>Sclerolaena</i> sp.							
<i>Sida corrugata</i>	Corrugated Sida	✓ <1 20	✓ <1 10	✓ <1 10	✓ <1 1	✓ <1 50	✓ <1 10
<i>Sida cunninghamii</i>	Ridged Sida	✓ <1 100	✓ <1 50	✓ <1 20	✓ <1 20	✓ <1 10	✓ <1 20
<i>Solanum esuriale</i>	Quena			✓ <1 5	✓ <1		
<i>Spergularia</i> sp.							
<i>Stackhousia monogyna</i>	Creamy Stackhousia		✓ <1 20			✓ <1 100	
<i>Stuartina muelleri</i>	Spoon Cudweed					✓ <1 500	
<i>Thysanotus patersonii</i>							
<i>Tricoryne elatior</i>	Yellow Autumn-lily		✓ <1 2	✓ <1 10			✓ <1 5
<i>Triptilodiscus pygmaeus</i>	Common sunray			✓ <1 50 ^{dead}		✓ <1 1000	✓ <1 50 - dead
<i>Velleia paradoxa</i>							
<i>Vittadinia cuneata</i>	Fuzzweed	✓ <1 10	✓ <1 20	✓ <1 20	✓ <1 100	✓ <1 3	✓ <1 2
<i>Wahlenbergia</i> (broad leaf) sp.							
<i>Wahlenbergia communis</i>	Tufted Bluebell						
<i>Wahlenbergia</i> sp.						✓ <1 2	
<i>Wurmbea dioica</i>							
<i>Xerochrysum bracteatum</i>	Golden Everlasting	✓ dead <1	✓ <1 20		✓ <1 10	✓ <1 1000	✓ <1 2
Unknown Asteraceae							
Unknown grass						✓ <1 1	

↑
mitchell?

[illegible]

Native	10 31	29	28	21	24	24
Exotic	8	16	12	11	13	13

Appendix D: Weed management receipt

M.I.A. SPRAYING SERVICE



ABN 79 958 186 159
PO BOX 553, GRIFFITH NSW 2680
PHONE: (02) 6964 0366
UHF 37 • MOBILE: 0428 676 207



PC

Specialising in Pest Control and Crop Spraying

HERBICIDE & PESTICIDE REPORT

0008
QUOTE

Client: *Griffith City Council*

Farm:

Address: *Att. John Rose*

Paddock No: Crop:

Crop Stage:

TIME	WEATHER	WIND DIRECTION	VELOCITY

PESTICIDE 1: Name
Rate per Hectare
L or Kg per Tank

PESTICIDE 1: Name
Rate per Hectare
L or Kg per Tank

PESTICIDE 1: Name
Rate per Hectare
L or Kg per Tank

WETTING AGENT/ADJAVANT:
Rate pr 100 L water:

Comments: *land full ute Bikes.*
Truck. ute Bikes.
\$200 + G.S.T. \$170 + G.S.T. \$115 + G.S.T.
a hour a hour a hour

Chemical
Grazon Extra 20L \$740 + G.S.T.
Vege Dye 20L \$500 + G.S.T.
Wetter 10L \$95 + G.S.T.
Appose \$25,000 ~~to~~ include G.S.T.

OPERATOR: *Ray*

DATE: *15-2-2017*

CLIENTS SIGNATURE:

COST \$
GST \$
TOTAL \$
TOTAL AMOUNT PAYABLE:

\$
CASH/CHEQUE
7 DAY ACCOUNT
(unless prior arrangements made)

2% Book keeping fees apply on overdue accounts