ebs restoration

Kanmantoo Copper Mine Environmental Management, Revegetation and SEB Offset Program

2017-2018 Progress Report

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2017-2018 Progress Report

10/09/2018

Prepared by EBS Restoration for Hillgrove Resources

Document Control					
Report No.	Date issued	Authors	Reviewed by	Date Reviewed	Revision type
1.0	10/09/2018	G.Glazier / S.McGovern	G.Glazier	7/09/2018	Draft

Distribution of Copies			
Report No.	Date issued	Media	Issued to
1.0	11/09/2018	Electronic	John Crocker, Hillgrove Resources

CITATION: EBS (2018) *Kanmantoo Copper Mine, Environmental Management, Revegetation and SEB Offset Program, 2016-2017 Progress Report.* Hillgrove Resources. EBS Restoration, Adelaide.

Front cover photo: Mine Road SEB Direct seeding and tubestock planting

EXECUTIVE SUMMARY

The EBS group, namely EBS Restoration and EBS Ecology, has been commissioned by Hillgrove Resources for the past seven years to assist with achieving a Significant Environmental Benefit (SEB) within the mine lease.

Key outcomes from the 2017-2018 (01Sep17 to 31Aug18) reporting period include:

- 2017-18 seed collection program where 520 kg of native seed was harvested, dried and packaged, including 1.5 kg of *Lomandra effusa* seed that will be used for 2019 tubestock planting program.
- 20 hectares of Pre-stripped direct seeding undertaken at Mine Road / Mulawa and Access road – lot 25 / Ferguson's during autumn 2018.
- Revegetation of 14,690 tubestock species and 152 Diuris sp plant rescues pots at various locations within and surrounding the mine lease.
- Provision of seed mixes for 24 hectares of hydroseeding requiring 422 kg of collected native seed which was carried out on various TSF and batter slopes within the mine lease.
- Management of the 7 hectares of SEB direct seeded strips at Mine road and 8 hectares within the North-west corner of the mine lease. Activities included significant weed control and tractor slashing activities to promote the spread of native species within these areas.
- Fire reduction program including tractor slashing and brushcutting during spring 2017, undertaken along access tracks, boundaries and around infrastructure.
- Management of native seed bank and resources on site, including The Seed Production Area (SPA) and Seed Multiplication Area (SMA) through targeted brushcutting, tractor slashing, boom spraying with herbicide and back pack herbicide spraying.
- Native Fauna monitoring (EBS Ecology).
- Landscape Function Analysis (LFA) EBS Ecology.
- Consolidation of existing native vegetation areas through targeted essential bushcare activities.

Forty four hectares of SEB offset areas were added during the 2017-18 program through hydroseeding and pre-stripped direct seeding. These and existing areas will require significant management over the coming years to ensure they become established vegetation communities and achieve SEB offset credits.

The Kanmantoo mine lease is a dynamic and evolving site and at times can provide a number of challenges in providing key outcomes. These challenges are mitigated through a combined effort between EBS staff and Hillgrove personnel.

The following recommendations are as follows:

- Manage and continue seed collection from the SPA, SMA, SEB strips and local areas to supply bulk seed for further large scale SEB offset rehabilitation.
- Continue Fauna monitoring and LFA program.
- Consolidate all SEB offset and remnant vegetation areas through weed control strategies
- Monitor viability of SPA to ensure seed production continues to outweigh management of this area.
- Continue tubestock revegetation program in SEB offset areas, monitor each year to determine high priority areas and species mix.
- Continue feral pest control programmes to control predation of native Flora and Fauna from introduced species.

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1 INTRODUCTION

In accordance with requirements under the *Mining Act 1971* a PEPR (Program for Environmental Protection and Rehabilitation) has been prepared for the Kanmantoo Copper Project. The latest version of the PEPR was in enacted October 2016 and is the key operational document for the mining project and details information on environmental control measures and outcome-based performance criteria. Hillgrove Resources have proposed to provide a Significant Environmental Benefit (SEB) for clearance of native vegetation within the mine lease through a range of activities detailed below.

Activities assigned to EBS Ecology / EBS Restoration during the 2017-2018 reporting period to assist in providing a SEB include;

- provision of project management services,
- seed collection, cleaning, storage and inventory,
- revegetation within SEB designated areas,
- management of the Seed Production Area (SPA)
- management of the Seed Multiplication Area (SMA),
- SEB maintenance across all sites currently under rehabilitation,
- annual progress report,
- fauna monitoring and reporting (EBS Ecology),
- general maintenance activities as instructed by Hillgrove resources,
- supply of seed for hydroseeding program,
- tractor slashing to reduce fire risk along access road and fence lines.

2 PROJECT REQUIREMENTS AND OUTCOMES

Key Tasks and a summary of outcomes for the 2017-18 reporting period are detailed in this section. The delivery of key tasks will assist Hillgrove Resources in achieving a SEB offset and fulfilling requirements outlined within the Kanmantoo Copper Mines - *Native Vegetation Management Plan*. Additional information on works undertaken prior to the 2017-18 reporting period can be found in previous Summary, Annual and LFA reports supplied by EBS Group to Hillgrove Resources.

Table 1 is an overview of tasks undertaken and outcomes for the 2017-18 reporting period.

Table 1. Task details and project outcomes

Task details	Progress outcomes	Comment
Project management	• Project management has been undertaken across all areas to insure project requirements are met in a timely and efficient manner.	Ongoing management.
Reporting - Annual progress report	• Draft progress report delivered to client September 2018	
Fauna survey	• Undertaken October 2017 • 1042 separate observations of 52 bird species • 76 separate observations of 6 mammal species	
LFA	• Refer landscape Function Report – EBS Ecology	
Seed collection, cleaning and management of seed	• Seed collection from October 17 through to April 18 • Collection from SPA, SMA and wild collection • All seed cleaned, batched, numbered and stored in EBSR warehouse • A total of 519 kg collected during the 2017-18 period including 1.5 kg of Lomandra effusa	Ongoing program
Revegetation	• 14,690 tubestock planted across various locations within and surrounding the mine lease • 152 Diuris sp. orchids planted during 2018	
Management of Seed production area (SPA) and Seed multiplication area (SMA)	• Ongoing seed collection over 2017 Spring and Summer seasons from both locations • On-going maintenance including tractor slashing and weed spraying required to keep SPA and SMA at high production levels	Ongoing management.
SEB maintenance	• Regular tractor slashing, Boom spraying and spot spraying of broadleaf weeds undertaken in SEB strips along Mine road, NW corner of the mine lease and in new 2018 direct seeding locations • Spot spraying and woody weed control	Ongoing management.

Task details	Progress outcomes	Comment
	undertaken within Hydroseeded areas • 68 Lomandra niches created as part of a seeding trial	
Pre-stripped Direct Seeding	• Approximately 20 hectares of area pre-stripped and direct seeded using 385kg of native seed	
Hydroseeding	• 24 hectares of Hydroseeding undertaken during 2018 using 422kg of native seed	Ongoing weed management
Fire reduction	• Tractor slashing undertaken prior to fire danger season along access road and perimeter fence lines to reduce fuel load. Brushcutting done around amenities	As required

2.2 Fauna monitoring and reporting

EBS Ecology has been commissioned by Hillgrove Resources for the past seven years (since 2011) to undertake an annual fauna monitoring program across the Kanmantoo Copper Mining Lease (ML). The 2017 survey is also the fourth year EBS has undertaken annual fauna monitoring within the new Significant Environmental Benefit (SEB) areas, adjacent to the Kanmantoo Copper Mine project site.

The 2017 spring survey was undertaken across three days: 9th, 10th and 11th October 2017. A roaming process was used to survey for birds both within the Mining Lease (ML) and Significant Environmental Benefit (SEB) areas, which was a repeat methodology from previous years. The ML was surveyed for birds and possums on the 10th October. The SEB area was surveyed for birds on 11th November and for possums on the evening of the 9th October.

Spotlighting along established transects within *E. odorata* (Peppermint Box) Woodland habitats was undertaken in search of the Common Brushtail Possum (*Trichosurus vulpecular*). Transects were surveyed over a two night period (one night in the ML and one night in the SEB area) for two hours, commencing approximately one hour after dusk. Any other species observed opportunistically were also recorded.

A total of 1042 bird observations of 52 bird species were recorded across both the ML bird roaming and SEB transects (**Error! Reference source not found.**). The most abundant species present during the 2017 survey were: Black-faced Woodswallow (*Artamus cinereus*) (260 individuals); State vulnerable Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*) (65 individuals), Adelaide Rosella (*Platycercus elegans adelaidae*) (65 individuals), Australian Raven (*Corvus coronoides*) (65 individuals) and Australian Magpie (*Gymnorhina tibicen*) (65 individuals). In comparison, a total of 530 observations of 42 bird species were recorded during the 2016 spring survey.

Five bird species of conservation significance were recorded within the during the 2017 spring survey, three of these species were observed within both the ML and SEB areas, one species was observed only in the ML, and another single species was observed only in the SEB area (**Error! Reference source not found.**). The bird species of conservation significance observed during the 2017 spring survey were:

- State vulnerable Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus)* (65 individuals);
- State rare White-winged Chough (*Corcorax melanorhamphos*) (45 individuals);
- Nationally listed marine Rainbow Bee-eater (*Merops ornatus*) (4 individuals);
- State rare Elegant Parrot (*Neophema elegans*) (28 individuals), and
- State vulnerable Diamond Firetail (*Stagonopleura guttata)* (4 individuals).

The results of the 2016 survey showed a substantial increase in bird abundance, and a moderate increase in diversity since 2016.

Six mammal species and a total of 76 observations were recorded during the 2017 spring survey in the mining lease area. Thirty Common Brushtail Possum (*Trichosurus vulpecula*) were recorded within the mine lease. This number is a substantial increase from the 2016 survey whereby 14 were recorded and is the highest number recorded since 2013. The Common Brushtail Possum was also targeted during a night of spotlighting within the SEB Pre-stripped areas off Mine road (09/10//17) but no observations of this species were made in this area. Possums have not been recorded in This location since the commencement of the monitoring surveys, which is to be expected based on the fact that woodland patches are scattered and do not provide suitable habitat for possums at present.

To date, Hillgrove Resources has made a positive contribution toward woodland enhancement and the planned rehabilitation of the site at the time of the mines closure. Rehabilitation operations continue to see areas of native woodland and grassland expand within the Mining Lease area and SEB areas. Hence, the conditions of the PEPR continue to be met.

The following general recommendations are made in the 2017 Kanmantoo Mine fauna Monitoring report:

- Continued annual abundance and diversity surveys of fauna species (birds and mammals) at the same time each year (preferably early spring / October of each year);
- Continued targeted surveys for indicator species such as the Diamond Firetail, Common Brushtail Possum, Peregrine Falcon, Yellow-tailed Black Cockatoo, Rainbow Bee-eater, Elegant Parrot and White-winged Chough;
- Visual inspections for wetland species (opportunistically as well as targeted at the dam located within the ML); and
- Database and document reviews, including a search for all incidents of fauna mortalities.

Further information regarding fauna monitoring can be found in the *Kanmantoo Mine Fauna Monitoring Report 2017, EBS Ecology.*

2.3 Provision of Project Management services

Project management has been undertaken for each task associated with the works program throughout the 2017-18 reporting period. Each task associated with the EBS group works program requires management and co-ordination to ensure it is implemented in the correct manner to achieve the results Hillgrove Resources require. As the tasks being undertaken change and evolve so too does the

management approach to achieve the desired outcome. Project management actions during this period included; resourcing personnel during peak periods, organising requirements for the seed production area (SPA), seed collection, organising tubestock and materials for the winter planting within SEB offset areas and ongoing interaction and liaising with stakeholders and subcontractors.

2.4 Landscape Function Analysis (LFA)

A Landscape Function Analysis (LFA) monitoring program has been implemented to measure the ongoing environmental management, restoration and Significant Environmental Benefit (SEB) offset program components of the Kanmantoo Mine in South Australia.

The vegetation monitoring program is in its sixth year, commencing in 2011 but excluding 2016 when the site was not monitored. Two nationally threatened ecological communities occur within the project area: Eucalyptus odorata (Peppermint Box) Open Woodland and Lomandra effusa (Scented Mat-rush) +/- Lomandra multiflora subsp. dura (Stiff Mat-rush) Open Tussock Grassland, which are both listed as critically endangered under the Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act). These sites now guide restoration targets for rehabilitation and SEB areas. Landscape Function data collected from existing analogue sites over a three year period (2011 to 2013) also provides a baseline with which to compare data for new restoration sites.

The 2017 monitoring included assessment of 14 existing sites and establishment and collection of baseline data for a further six new sites (Refer Kanmantoo Copper Mine Landscape Function Analysis Monitoring Report, September 2017 EBS Ecology). At a property level the restoration sites exist at various states and points of rehabilitation. However, the vast majority of rehabilitation sites are indicating successful germination and positive trends toward analogue landscape function indices and restoration goals.

The rehabilitation sites established in existing Eucalyptus odorata (Peppermint Box) Open Woodland areas (KANODO 4, KANODO 5 and KANODO 6, (Figure 2) were generally in poor to moderate condition, however there are small variations in the data which indicate that removal of grazing and favourable seasonal conditions in 2015 are benefiting the vegetation community. Structural changes such as fallen limbs and increased shrub size are slowly adding to the complexity of the landscapes within these areas. Due to high numbers of Kangaroos potentially increasing the grazing intensity associated with understorey forbs, and therefore limiting regeneration, rehabilitation may be a drawn out process. Moderate levels of understorey restoration have been undertaken with varying success of seedling survival rates, however it is anticipated the LFA index values will begin to move toward target range values, once the understorey begins to improve.

A number of existing sites established on the Waste Rock Landform (WRL) (KANODO-RT7, RT10, RT11, RT12, RT13, RT14, RT16 and RT17 were established with the aim of trialling a number of rehabilitation treatments to restore the sites to Peppermint Box Woodland. Sites which used a combination of hydro seeding and tube stock planting have shown establishment of the grass and groundcover / subshrub layer which resulted in high stability indices. Areas subject to only hydro seeding also had very high establishment rates of grass tussocks. Areas where no treatment was applied were close to original state with little natural regeneration observed. The results highlight that rehabilitation is possible on waste rock substrates without topsoil cover, if perennial grass seed is applied to the substrate and seasonal conditions allow germination and establishment of the species used.

A permanent site (KANODO 09) previously established in ex-cropping land on Smelter Road, was sowed with native grasses in 2012, following the removal of 100mm of topsoil. This area is being restored as a Eucalyptus odorata (Peppermint Box) open woodland and in 2015 experienced a significant germination of native grasses; in addition to native herbs and shrubs. The site has continued to show successful establishment in 2017 with grass tussocks increasing in size and a patchier structure developing that is more indicative of the restoration goals represented in analogue sites.

Four additional monitoring sites were established within another scraped area east of Mine Road in 2017, including one Acacia (KANACA RT 02) and three Peppermint Box Woodland transects (KANODO RT 18, KANODO RT 19 and KANODO RT 20). These sites have experienced proliferation of native grass swards following seeding and results indicate exceptionally high stability, infiltration and nutrient cycling function above that of analogue sites. At this early stage of rehabilitation, positive indicator results appear to exceed expectations. However, these sites lack the structural complexity anticipated once tube stock establishes over several years.

Another new site (KANACA 01) was established at the top of the pit. The site had previously been hand broadcasted with seed over a bank trough structure. Although landscape function index values for the site remained below analogue sites, qualitative observations indicated the site had experienced germination of a number of species providing up to 70% cover.

The first Lomandra Grassland (KANLOM 01) rehabilitation site was established in 2017 on a mine wall slope which had been heavily ripped and planted with Lomandra tube stock. The structural complexity at this point comprises a bank trough structure without any organic cover and as expected, all indices are below analogue grassland target values, but are expected to increase.

A permanent site (KANODO 09,) previously established in ex-cropping land on Smelter Road, was sowed with native grasses in 2012, following the removal of 100mm of topsoil. This area is being restored as a Eucalyptus odorata (Peppermint Box) open woodland and in 2015 experienced a significant germination of native grasses; in addition to native herbs and shrubs. The site has continued

to show successful establishment in 2017 with grass tussocks increasing in size and a patchier structure developing that is more indicative of the restoration goals represented in analogue sites.

A permanent site (KANGRA 01) was established in 2013 in the seed production 'Laydown' area which has been established with the long-term view of restoring it to a Eucalyptus odorata (Peppermint Box) Open Woodland community. The condition of the site in 2015 was reported as being in very poor condition, but having been sowed with native grasses and herbs since that period, the transect has shown consistent advancing trends in functional attributes following the 2017 assessment.

2.5 Seed collection, cleaning and management of seed

Between November 2017 and April 2018 approximately 520 kilograms of native seed were collected from various sources within the Kanmantoo mine lease and surrounding areas (Refer Table 2 – 2017-18 seed collection tally). Primary locations for collection include; the Seed Multiplication Area (SMA) located adjacent to access road, this location is divided into grass plots. The 2015 direct seeded strips alone Mine road produced large amounts of mixed native grass species. Surrounding areas including local roadsides and Frahns Scrub supplied various understorey, midstorey and overstorey species. The Seed Production Area (SPA) continues to provide species such as Themeda, Rytidosperma and assorted chenopod species.

Continuing from the marking of flowering Lomandra effusa in May 2017 EBSR staff were able to easily locate and harvest seed producing plants in November 2017. Frahns scrub supplied the majority of Lomandra effusa seed together with collections from within the mine lease in Kavanagh woodlands. The Lomandra effusa is a key species in the rehabilitation of Lomandra grasslands as part of the SEB offset program. Approximately 1.5 kilograms of seed was collected. 637 grams was supplied to Jenny Guerin at the Seed Research Centre, Botanic gardens to be tested for viability and pre-treatment undertake (Refer Appendix 1). 237 grams of the pre-treated Lomandra seed was used in niche seeding trials along the access road and dispersed within the 2018 pre-stripped areas (Refer Figure 10). An additional 440 grams of Lomandra effusa seed has been supplied to State Flora for propagation of tubestock for the 2019 planting program.

Collection of key grass species in 2017-18 was made more efficient due to the investment of a vehicle mounted grass grabber (Refer Figure 2). Due to the short period of time that native grass seed is available prior to natural dispersion, this machine has proved valuable for rapid collection and increasing yields.

Timed tractor slashing with broadacre and targeted broadleaf spraying events within the SMA continue to see this are as a valuable seed resource and possible future offset location. During July 2018 a pelletised fertiliser was hand broadcast throughout the SMA with the purpose of rejuvenating the grass species found within. The original grass plots within the SMA are gradually blending together to form one large mixed native grassland consisting of Themeda, Austrostipa sp, Rytidosperma sp, Enneapogon, Chloris and Aristida sp. Harvesting this area usually entails the collections of several species at one time.

As part of the 2018 Pre-stripped direct seeding program several grass only strips were sown to allow for future collection of key grass species as part of the Kanmantoo rehabilitation program (Refer section 2.7 Direct Seeding Pre-stripped areas)

EBS Restoration has a large warehouse that it uses to dry and store seed after collection. Seed is laid on tarps where it is turned regularly until dry. Depending on the type of seed it is either threshed and sieved (eg Acacias) or mulched (eg grasses). Bulk grass seed is then stored in Wool bales or Chaff bags while smaller amounts of varied seed is sealed in vacuumed packed airtight bags (Refer Figure 3).

Table 2. 2017-18 seed collection tally

Species	Batch number	Collection location	Collection date	Amount collected
Rytidosperma sp. (Danthonia)	EBSKAN198	SPA	Nov-17	22.000
Austrostipa/Rytidosperma mix sp.	EBSKAN199	Mine rd SEB	Nov-17	391.000
Themeda triandra	EBSKAN200	SPA / SMA	Dec-17	72.000
Chloris truncata	EBSKAN201	SPA / SMA	Jan-18	12.500
Aristida behriana	EBSKAN202	SMA	Dec-17	1.300
Enneapogon nigricans	EBSKAN203	SMA	Jan-18	
Austrostipa blackii	EBSKAN204	surrounding area	Nov-17	3.000
Vittadinia sp. Mix	EBSKAN205	surrounding area	Nov-17	2.300
Cullen australasicum	EBSKAN206	surrounding area	Nov-17	0.630
Eucalyptus leucoxylon	EBSKAN207	surrounding area	Feb-18	0.033
Chrysocephalum apiculatum	EBSKAN208	surrounding area	Dec-17	0.072
Kennedia prostrata	EBSKAN209	surrounding area	Nov-17	0.215
Lomandra effusa	EBSKAN210	surrounding area	Nov-17	0.890
Helichrysum leucopsideum	EBSKAN211	surrounding area	Nov-17	0.031
Lotus australis	EBSKAN212	surrounding area	Nov-17	0.020
Arthropodium sp.	EBSKAN213	surrounding area	Nov-17	0.033
Olearia pannosa	EBSKAN214	surrounding area	Nov-17	0.025
Maireana brevifolia	EBSKAN215	surrounding area	Mar-18	1.200
Eucalyptus socialis	EBSKAN216	surrounding area	Feb-18	0.065
Eucalyptus calycogona	EBSKAN217	surrounding area	Feb-18	0.030
Allocasuarina verticillata	EBSKAN218	surrounding area	Dec-17	2.530
Dodonaea viscosa	EBSKAN219	surrounding area	Dec-17	3.200
Callitris gracillis	EBSKAN220	surrounding area	Dec-17	2.460
Acacia pycnantha	EBSKAN221	surrounding area	Dec-17	2.650
Bolboschoenus caldwellii	EBSKAN222	surrounding area	Nov-17	0.350
Lomandra effusa	EBSKAN223	surrounding area	Nov-17	0.637
total (kg)				**519.171**

Figure 1 Lomandra collection at Frahns scrub 2018

Figure 2 Gator mounted Grass Grabber

Figure 3. Various native seed drying

2.6 Revegetation

A total of 14,690 tubestock were planted during 2018 (Refer table 3 – Revegetation List 2018). Tubestock planting was undertaken in various locations in and outside the mine lease. Due to the quantity of tubestock for the 2018 program EBSR, in agreement with Hillgrove resources decided to vary the planting technique form previous years. Previously tubestock planting was undertaken in pre-prepared locations where a 10litre bowl was scraped, fertiliser added and a tubestock protected with a treeguard and stake. Additionally plants were watered at time of planting and several follow up watering was undertaken during the 2017-2018 summer period. In 2018 tubestock were planted en masse using a combination of mattocks, Hamilton planters and auger. A simple scrape was prepared for the purpose of weed control and planting location. No watering was carried out at time of planting. Follow up halo spraying will occur during spring.

2018 tubestock planting locations include:

- Hillside adjacent the SMA (Previously planted in 2012)
- Infill in 2015 seeded strips on Mine road. Designed to enhance biodiversity as several tubestock species were not part of the 2015 direct seeding mix.
- Continuation of northern TSF rehab surface plantings undertaken in previous years.
- Ridgeline / Hillside linking 2018 pre-stripped areas bordered by the access road and Mine road.
- Emily rehabilitation slope.

A quantity of the Dianella revoluta tubestock was planted throughout the 2018 pre-stripped areas including Ferguson's, Lot 25 and Mine road/Mulawa. This was done due to the fact that Dianella is not included in the direct seeding mix.

2018 saw a continuation of the Diuris relocation program in conjunction with the South Australian Orchid Society. 152 Diuris sp were supplied and relocated in small clusters to various locations (Refer Appendix 2).

Table 3 Revegetation list 2018

Genus	***Species***	***Planted***
Allocasuarina	*verticillata*	*2,500*
Bursaria	*spinosa*	*500*
Callitris	*gracilis*	*1,500*
Dianella	*revoluta*	*1,000*
Dodonaea	*spathulata*	*2,500*
Eucalyptus	*leucoxylon*	*1,500*

Genus	Species	Planted
Eucalyptus	*odorata*	*2,040*
Eucalyptus	*socialis*	*500*
Eucalyptus	*calycogona*	*500*
Eucalyptus	*phenax*	*500*
Pittosporum	*angustifolium*	*400*
Senna	*artemisioides ssp coriacea*	*500*
Senna	*artemisioides ssp artemisioides*	*250*
Senna	*artemisioides petiolaris*	*500*
	Total	*14,690*

Figure 4 Tubestock planting within the Mine Road SEB strips

Figure 5 Diuris plantings

2.7 Management of Seed Production Area (SPA) and Seed Multiplication Area (SMA)

The SPA located in the NW corner of the mine lease and the SMA located adjacent the access road into the mine are key areas for seed collection on land owned by Hillgrove Resources.

The SPA has been growing a diverse range of plants for harvest through its varied plots and irrigation system for approximately six years. The SPA requires ongoing maintenance to keep the infrastructure, namely fence protecting the areas from Kangaroos and Rabbits and the irrigation system in good working order. The plants grown within the SPA require regular weed control and maintenance through hand weeding, spot spraying with herbicide, pruning and replacing as required. The grass plots within the SPA require regular mowing and broadleaf spraying to maintain purity and productivity.

Consideration is currently underway for rejuvenation and/or possible relocation of the SPA. Given its location within the NW corner of the mine lease there may be concerns regarding access in the future.

The SMA is primarily made up of grass plots with one plot of *Vittadinia* sp. The grass plots are regularly sprayed with broadleaf herbicide and slashed in such a way as to promote the spread of the native grasses. Slashing usually occurs after harvesting in December and subsequently in early spring if required. This technique has been very successful with the grass plots self-sustaining with minimal weed infestations and the native grasses now spreading into the surrounding landscape. Due to the success of promoting native grasses the grass plots boundaries are becoming less defined. The Vittadinia plot is a prime example of this occurrence with native grass species now spread throughout. Regularly spot sprayed and selective brushcutting is carried out to reduce the spread of exotic grass and herbaceous species. Further to the 2017 Seamungus fertiliser program an additional 200 kilograms of the same fertiliser was hand broadcast throughout the SMA grass plots.

The SMA although currently used as a seed harvesting resource will eventually be classified as an SEB offset area. Future revegetation with overstorey and shrub species will result in a high quality open woodland area.

2.8 Direct Seeding Pre-striped areas

Since 2014 a total of approximately thirty five hectares has been pre-stripped and hand direct seeded. This task involves removing 100mm of topsoil in approximately 6 metre wide strips. After the topsoil is removed a tractor and power rake is used to conditions the soil. Hand direct seeding immediately follows this process, with the power rake again being used to evenly distribute the seed in the soil.

In 2018 approximately 20 hectares of pre-stripped direct seeding was undertaken using 385 kilograms of collected native seed. Although the base species of the direct seeding mixes are the same EBSR made up four separate seed mixes with variation occurring primarily across dominant overstorey species (Refer Table 5. 2018 direct seeding mixes). The seed mixes consisted of; eight bales of Eucalyptus odorata, eight bales of Acacia pycnantha, one bale of Austrostipa grassland and one bale of Lomandra grassland. Additional area outside the pre-strips became available for direct seeding during the process including a filled in creekline at Mine road and the end sections of the strips, these additional areas ended up being 3.7 hectares and were sewn with the four bales of leftover hydroseeding mix. (Each bale covers approximately one hectare).

Table 4 Direct seeding times and locations

Year	Location	Approximate area (hectares)
2014	North West corner of Mine lease	4
2014	Smelter Road	.2
2015	North West corner of Mine lease	4
2015	Mine Road / Mulawa	7
2018	Mine Road / Mulawa	8
2018	Mine Road / Mulawa edges (erosion gully and surrounds)	3.7
2018	Access road sites (lot 25 / Ferguson's)	8
Total		34.9

Figure 6. Tractor with Power Rake conditioning the soil

Figure 7. EBSR staff hand direct broadcasting native seed

Table 5. 2018 Direct seeding mixes

Species	Batch number	2018 Direct Seeding mix (8 bales @ 1 hectare each - Eucalyptus odorata mix)	2018 Direct Seeding mix (8 bales @ 1 hectare each - Acacia pycnantha mix)	2018 Direct Seeding mix (1 bale @ 1 hectare each - Austrostipa grassland mix)	2018 Direct Seeding mix (1 bale @ 1 hectare each - Lomandra grassland mix)
		amount	amount	amount	amount
Enneapogon nigricans	EBSKAN14	0.000	0.000	1.500	1.500
Acacia pycnantha	EBSKAN20	0.400	2.000	0.000	0.025
Ptilotus spathulatus	EBSKAN35	0.000	0.000	0.000	0.030
Clematis microphylla	EBSKAN72	0.080	0.080	0.000	0.020
Acacia acinacea	EBSKAN73	0.000	0.000	0.000	0.010
Ptilotus spathulatus	EBSKAN78	0.041	0.000	0.000	0.000
Eucalyptus odorata	EBSKAN94	1.600	0.400	0.010	0.010
Eucalyptus socialis	EBSKAN96	0.000	0.000	0.000	0.010
Convolvulus remotus	EBSKAN102	0.200	0.200	0.000	0.000
Atriplex semibaccata (half chaff)	EBSKAN107	4.000	4.000	0.250	0.250
Rytidosperma sp. (Danthonia)	EBSKAN113	5.600	5.600	0.000	0.000
Themeda triandra	EBSKAN118	0.000	4.000	0.500	0.000
Podolepsis rugata	EBSKAN125	0.065	0.000	0.010	0.010
Hardenbergia violacea	EBSKAN126	0.000	0.400	0.000	0.025
Helichrysum leucopsideum	EBSKAN128	0.040	0.000	0.010	0.010
Whalenbergia stricta	EBSKAN129	0.008	0.000	0.000	0.000
Chrysocephalum semipapposum	EBSKAN130	0.160	0.000	0.020	0.010
Senecio quadridentatus	EBSKAN142	0.000	0.000	0.010	0.000
Bothriochloa macra	EBSKAN145	4.000	4.000	0.000	0.000
Elymus scaber	EBSKAN146	0.000	0.000	0.000	0.350
Olearia pannosa	EBSKAN150	0.072	0.000	0.000	0.000
Vittadinia blackii	EBSKAN157	2.000	2.000	0.250	0.250
Chrysocephalum apiculatum	EBSKAN159	0.000	0.054	0.010	0.000
Podolepis rugata	EBSKAN161	0.015	0.000	0.000	0.000

Species	Batch number	2018 Direct Seeding mix (8 bales @ 1 hectare each - Eucalyptus odorata mix)	2018 Direct Seeding mix (8 bales @ 1 hectare each - Acacia pycnantha mix)	2018 Direct Seeding mix (1 bale @ 1 hectare each - Austrostipa grassland mix)	2018 Direct Seeding mix (1 bale @ 1 hectare each - Lomandra grassland mix)
Gonocarpus tetragynus	EBSKAN163	0.080	0.080	0.000	0.000
Rytidosperma sp. (Danthonia)	EBSKAN166	11.200	11.200	0.000	0.000
Austrostipa/Rytidosperma mix sp.	EBSKAN167	2.000	2.000	0.000	0.000
Austrostipa sp.	EBSKAN168	4.000	4.000	0.000	0.000
Cymbopogon ambiguus	EBSKAN172	0.000	0.000	0.000	0.500
Dicanthium sericeum	EBSKAN173	0.000	0.000	0.000	0.500
Kennedia prostrata	EBSKAN178	0.000	0.160	0.020	0.020
Dodonaea viscosa	EBSKAN179	0.680	0.460	0.025	0.025
Enchylaena tomentosa	EBSKAN180	2.000	2.000	0.000	0.000
Callitris gracillis	EBSKAN181	0.400	0.000	0.025	0.025
Allocasuarina verticillata	EBSKAN182	0.400	0.400	0.025	0.025
Whalenbergia sp.	EBSKAN183	0.016	0.000	0.000	0.000
Kennedia prostrata	EBSKAN185	0.160	0.000	0.000	0.000
Vittadinia sp.	EBSKAN187	0.120	0.000	0.000	0.000
Maireana brevifolia	EBSKAN188	0.800	0.200	0.000	0.000
Themedia triandra	EBSKAN189	0.000	0.000	1.500	2.000
Rytidosperma sp. (Danthonia)	EBSKAN191	24.000	24.000	1.000	4.000
Austrostipa/Rytidosperma mix sp.	EBSKAN192	44.000	44.000	0.000	0.000
Austrostipa sp.	EBSKAN193	24.000	24.000	8.000	4.000
Chloris truncata	EBSKAN194	4.000	4.000	0.000	0.500
Senna artimissioides	EBSKAN195	1.600	0.800	0.025	0.025
Themeda triandra	EBSKAN200	4.000	0.000	0.000	0.000
Chloris truncata	EBSKAN201	0.000	0.000	1.000	0.000
Aristida behriana	EBSKAN202	0.000	0.000	0.000	0.500
Austrostipa blackii	EBSKAN204	0.000	0.000	2.000	0.000

Species	Batch number	2018 Direct Seeding mix (8 bales @ 1 hectare each - Eucalyptus odorata mix)	2018 Direct Seeding mix (8 bales @ 1 hectare each - Acacia pycnantha mix)	2018 Direct Seeding mix (1 bale @ 1 hectare each - Austrostipa grassland mix)	2018 Direct Seeding mix (1 bale @ 1 hectare each - Lomandra grassland mix)
Vittadinia sp. Mix	EBSKAN205	0.840	0.960	0.120	0.120
Cullen australasicum	EBSKAN206	0.000	0.082	0.000	0.000
Chrysocephalum apiculatum	EBSKAN208	0.000	0.026	0.000	0.000
Lotus australis	EBSKAN212	0.000	0.000	0.010	0.010
Arthropodium sp.	EBSKAN213	0.000	0.000	0.010	0.010
Maireana brevifolia	EBSKAN215	0.000	0.600	0.000	0.000
Dodonaea viscosa	EBSKAN219	0.000	0.220	0.000	0.000
Total seed amount (kg)		142.58	141.92	16.33	14.77
Amount per hectare (kg)		**17.82**	**17.74**	**16.33**	**14.77**

2.9 SEB maintenance and enhancement

SEB areas within and surrounding the mine lease include all previously hydroseeded and direct seeded locations, all tubestock plantings, orchid relocations and all areas of remnant vegetation. The aim of maintaining these locations is to promote and enhance the spread of native species while limiting the threat of introduced pest species.

Pre-stripped direct seeding areas now cover approximately 35 hectares. Direct seeding strips from 2014-15 are now well established with significant native regeneration occurring. These areas require less intensive weed control as they become more self-sustaining. Weed control within these areas is undertaken through targeted spot spraying and selective brushcutting as required.

Preceding to the 2018 direct seeding program at Mine road, regular broadacre spraying and tractor slashing was required within the mid rows to prevent ingress of exotic species. These actions were important in ensuring the success of the direct seeding program within the Mine road area. Following on from the 2018 direct seeding program a similar maintenance approach shall be required in all new locations of direct seeding where untreated pasture mid rows remain. As part of the direct seeding process topsoil was removed and stockpiled. The stockpiles at Mine road have been seeded with the hydroseeding seed mix with the purpose of stabilising and future seed collection. Where practicable stockpile at all stripped locations will be tractor slashed in conjunction with maintenance program.

Upon completion of the 2018 direct seeding program in June, a significant amount of broadleaf germination has occurred across a number of seeded strips (Refer Figure 8). These outbreaks have been boom sprayed with the intention of supressing weeds prior to native seed germination in spring. Annual exotic grass species have also been observed within these strips therefore tractor slashing may be required during spring / summer prior to seed set.

Hydroseeding locations are to be maintained as required. This is anticipated to include woody weed control in conjunction with targeted spot spraying. This is scheduled to occur in spring a summer 2018-19.

Tubestock planting undertaken in 2017 was maintained through watering during spring and summer, targeted spot spraying and hand weed as required. Tree guard removal was undertaken where necessary during autumn 2018 and will continue as required. The 2018 tubestock shall be ring sprayed to prevent weed spread and reduce competition.

In 2018 several new areas have been identified and added to the SEB maintenance/enhancement program. Predominantly Lomandra grasslands these areas are located at McFarlanes Hill and on Back

Callington / Éclair Mine road. No previous rehabilitation work has been conducted within these areas by EBS Restoration. Extensive brushcutting was undertaken during April - May 2018 to reduce the biomass of weeds present predominantly Scabiosa (Refer Figure 9). Follow up broadleaf spraying has been undertaken, the aim to reduce the level of weed infestation and subsequent germination of this species.

In winter 2018 a total of 68 niches (60x60 cm) were created across the new Lomandra sites. Pre-treated Lomandra seed (approximately 150 seeds per niche) were sewn into these niches as part of a rehabilitation trial. Each niche has been covered in fencing wire to protect against predation (Refer Figure 10). EBSR in conjunction with Hillgrove Resources have supplied State Flora with 440 grams of Lomandra effusa seed with the intention of propagating as many Lomandra as possible for the 2019 revegetation program that will be conducted within these areas. Extensive follow-up weed control is required across these sites in the future.

The Diuris Orchid species planted in 2017 were maintained through spot spraying and hand weeding around the plantings. Use of mesh tree guards has been observed to be successful in preventing damage from pest animal species i.e. Rabbits and kangaroos.

Areas of remnant vegetation continue to be monitored and weed control activities conducted where necessary. Bridal Creeper and thistle species have been controlled during active growth periods. Woody weed control has commenced on Mine road and will continue across all areas during 2018-19.

Weed control was carried out on Smelter road where brushcutting of Scabiosa, follow up spot spraying and tree guard removal was undertaken.

Figure 8. Broadleaf weed germination within 2018 direct seeded pre-strips. These areas were broadleaf sprayed shortly after

Figure 9 Brushcutting new SEB Lomandra grassland locations

Figure 10 Lomandra niche seeding

2.10 Hydroseeding

In March / April 2018 EBSR were commissioned to batch up native seed for 28 hectares of hydroseeding. A total of 492 kilograms of collected seed was weighed and sorted into one hectare amounts (Refer Table 6). Hydroseeding was undertaken within the mine lease on rehabilitation surfaces and slopes. A total of 24 bales, equivalent to 24 hectares was hydroseeded in the program (the remaining four bales were used for direct seeding purposes Refer section 2.8). Hillgrove Resources have indicated that the 2019 Hydroseeding program will consist of 45-50 hectares requiring a significant amount of locally collected native seed.

Table 6 2018 Hydroseeding species mix and totals

Species	Batch number	Total 2018 Hydroseeding mix (28 bales @ 1 Hectare each)	Amount per hectare
		amount (kg)	amount (kg)
Acacia pycnantha	EBSKAN20	8.200	0.293
Eucalyptus odorata	EBSKAN94	1.400	0.050
Dodonaea viscosa	EBSKAN97	1.600	0.057
Callitris gracilis	EBSKAN101	0.155	0.006
Maireana brevifolia	EBSKAN109	0.700	0.025
Rytidosperma sp. (Danthonia)	EBSKAN113	16.800	0.600
Atriplex semibaccata	EBSKAN133	14.000	0.500
Enchylaena tomentosa	EBSKAN137	5.500	0.196
Convolvulus erubescens	EBSKAN148	1.200	0.043
Vittadinia blackii	EBSKAN157	8.920	0.319
Maireana brevifolia	EBSKAN162	0.600	0.021
Rytidosperma sp. (Danthonia)	EBSKAN166	33.600	1.200
Austrostipa/Rytidosperma mix sp.	EBSKAN167	6.000	0.214
Austrostipa sp.	EBSKAN168	12.000	0.429
Cullen australasicum	EBSKAN175	0.052	0.002
Enchylaena tomentosa	EBSKAN176	1.000	0.036
Atriplex semibaccata	EBSKAN177	12.000	0.429
Dodonaea viscosa	EBSKAN179	2.000	0.071
Enchylaena tomentosa	EBSKAN180	0.500	0.018
Callitris gracillis	EBSKAN181	2.584	0.092
Allocasuarina verticillata	EBSKAN182	2.588	0.092
Vittadinia sp.	EBSKAN187	2.880	0.103
Maireana brevifolia	EBSKAN188	1.100	0.039
Rytidosperma sp. (Danthonia)	EBSKAN191	72.000	2.571
Austrostipa/Rytidosperma mix sp.	EBSKAN192	132.000	4.714
Austrostipa sp.	EBSKAN193	72.000	2.571
Chloris truncata	EBSKAN194	12.000	0.429

Species	Batch number	Total 2018 Hydroseeding mix (28 bales @ 1 Hectare each)	Amount per hectare
Senna artimissioides	EBSKAN195	7.000	0.250
Austrostipa/Rytidosperma mix sp.	EBSKAN199	56.000	2.000
Chloris truncata	EBSKAN201	4.000	0.143
Cullen australasicum	EBSKAN206	0.548	0.020
Allocasuarina verticillata	EBSKAN218	0.412	0.015
Dodonaea viscosa	EBSKAN219	0.600	0.021
Callitris gracillis	EBSKAN220	0.060	0.002
	total (kg)	491.999	17.57

2.11 Fire reduction programs

Slashing of fire breaks was carried out in December of 2017. The tractor slasher was primarily used in conjunction with brushcutting around buildings and infrastructure on and off the mine lease. Areas included pedestrian walking tracks, dust sampler enclosures and boundary fences along the Northern and Western boundaries of the lease.

During winter of 2018 EBS Restoration took delivery of a new custom made slashing deck which has a 200litre capacity demountable firefighting unit. This upgrade to machinery should ensure efficient and safe tractor slashing over future seasons.

3 APPENDIX

3.1 Lomandra effusa viability, pre-treatment and germination trial 2018

Pretreatment of *Lomandra effusa* seeds for rehabilitation at Hillgrove Copper Mine, Kanmantoo.

Background

Previous experiments in the laboratory have shown that the germination rate of *Lomandra effusa* increased after treatment with 30% hydrogen peroxide and gibberellic acid (saseedbank.com.au).

Seeds were collected and stored by EBS and provided to the South Australian Seed Conservation Centre to treat before sowing at Hillgrove Kanmantoo site.

Seed Batch EBSKAN 223 11-17

Bag 1 735 g - cleaned with aspirator to pure seed 541g approx. 21640 seeds.

Bag 2 170 g – cleaned with aspirator to pure seed 137g approx. 5480 seeds.

Viability of seeds

Seeds appeared mature displaying darkened pigment around the hilum and micropyle areas.

Cut test of 20 seeds shows embryos are intact indicating viable seeds.

Treatment-

- Seeds treated with 30% hydrogen peroxide 15 mins
- Seeds washed with water
- Seeds soaked in 500 mg/L gibberellic acid 20 h
- Seeds washed with water and dried.

Germination Incubator Conditions:

Seeds (n=30) were incubated on 1% agar under the following incubator program:

5°C for 4 hours (11pm to 3am) 15°C for 20 hours (3am to 11pm) 14hr dark (6pm to 8am) 10hr light (8am to 6pm).

Germination Results:

Seeds from EBSKAN 223 11-17 reached 26% germination after 7 weeks.

As a control seeds from a previous collection of *Lomandra effusa* seeds collected from Frahns Scrub October 2017 were removed from the seed bank and tested with the same treatment resulting in 58% germination after 7 weeks.

50 treated seeds (EBSKAN 223 11-17) were planted into potting soil on 24 April 2018 and kept in the shade house at Adelaide Botanic Gardens. A total of 6 (12%) of seeds had emerged as seedlings by 1st of August 2018. More seedlings may emerge from this trial during spring temperatures.

3.2 Diuris planting clusters 2018


316500
317000
317500
318000
318500
319000
6117000
6116500
6116000
6115500
6115000
6114500
6114000
6113500
ADELAIDE
KANMANTOO
Project footprint
Mineral Lease
Plantings
0
0.5
1
km
Produced by: EBS Ecology
Coordinate System:
GDA 1994 MGA Zone 54
Date: 31/08/2018

3.3 Seed inventory as of September 2018

Species	Batch number	Collection location	Collection date	Amount Sept 2018
Acacia pycnantha	EBSKAN20	Kanmantoo mine site	Dec-11	36.960
Acacia paradoxa	EBSKAN21	Kanmantoo mine site	Dec-11	1.010
Acacia menzelii	EBSKAN24	Kanmantoo mine site	Dec-11	0.170
Eucalyptus camaldulensis	EBSKAN25	Kanmantoo mine site	2011	0.965
Velleia paradoxa	EBSKAN28	Kanmantoo mine site and surrounds	Dec-12	0.015
Arthropodium sp.	EBSKAN50	Kanmantoo mine site and surrounds	Dec-12	0.105
Clematis microphylla	EBSKAN72	Kanmantoo mine site and surrounds	Nov-13	0.209
Acacia acinacea	EBSKAN73	Kanmantoo mine site and surrounds	Nov-13	0.356
Ptilotus spathulatus	EBSKAN78	SPA	Nov-13	0.041
Cymbopogon ambigus	EBSKAN92	SPA	Dec-13	14.800
Acacia argyrophylla	EBSKAN93	Kanmantoo mine site and surrounds	Dec-13	11.920
Eucalyptus odorata	EBSKAN94	Kanmantoo mine site	Feb-14	0.898

Species	Batch number	Collection location	Collection date	Amount Sept 2018
Eucalyptus phenax	EBSKAN95	Kanmantoo mine site	Feb-14	0.108
Eucalyptus socialis	EBSKAN96	Kanmantoo mine site	Feb-14	0.025
Enteropogon acicularis	EBSKAN99	SPA	Dec-13	1.400
Convolvulus remotus	EBSKAN102	SPA	Feb-14	0.320
Atriplex semibaccata (half chaff)	EBSKAN107	SPA	2014	11.500
Cassinia arcuata	EBSKAN108	Kanmantoo mine site and surrounds	2014	1.400
Eucalyptus calycogona	EBSKAN110	Kanmantoo mine site and surrounds	2014	0.180
Callitris canescens	EBSKAN111	Kanmantoo mine site and surrounds	2014	0.080
Rytidosperma sp. (Danthonia)	EBSKAN113	SPA, SMA	Dec-14	0.500
Goodenia pinnatifida	EBSKAN115	SPA	Dec-14	0.050
Chloris truncata	EBSKAN116	SPA	Dec-14	3.000
Cymbopogon ambigus	EBSKAN117	SPA	Dec-14	7.500
Hardenbergia violacea	EBSKAN126	SPA	Nov-14	0.343
Helichrysum leucopsideum	EBSKAN128	SPA and surrounds	Dec-14	0.010
Rhagodia crassifolia	EBSKAN134	Kanmantoo mine site and surrounds	Jan-15	0.125
Einadia nutans	EBSKAN139	SPA	Feb-15	0.170
Senecio quadridentatus	EBSKAN142	SPA	Feb-15	0.089
Enneapogon nigricans	EBSKAN143	SPA	Feb-15	0.600
Bothriochloa macra	EBSKAN145	SPA	Feb-15	4.000
Convolvulus erubescens	EBSKAN148	SPA		1.800
Olearia pimeleoides	EBSKAN149	Kanmantoo mine site	Oct-15	0.011

Species	Batch number	Collection location	Collection date	Amount Sept 2018
Olearia pannosa	EBSKAN150	Surrounds	Oct-15	0.005
Santalum acuminatum	EBSKAN151	Surrounds	Oct-15	0.013
Eucalyptus calycogona	EBSKAN154	Kanmantoo mine site	Jan-16	0.071
Eucalyptus odorata	EBSKAN155	Kanmantoo mine site	Dec-15	0.757
Vittadinia blackii	EBSKAN157	SMA	Oct-15	2.500
Chrysocephalum semipapposum	EBSKAN158	SPA	Nov-15	0.040
Helichrysum leucopsideum	EBSKAN160	SPA	Nov-15	0.037
Podolepis rugata	EBSKAN161	SPA	Dec-15	0.250
Gonocarpus tetragynus	EBSKAN163	SPA	Nov-15	0.078
Convolvulus remotus	EBSKAN164	SPA	Dec-15	0.055
Bothriochloa macra	EBSKAN169	SPA	Nov-15	4.000
Enneapogon nigricans	EBSKAN171	SPA	Nov-15	1.000
Cymbopogon ambiguus	EBSKAN172	SPA	Nov-15	2.500
Dicanthium sericeum	EBSKAN173	SPA	Nov-15	7.000
Convolvulus remotus	EBSKAN174	SPA	Dec-14	0.880
Enchylaena tomentosa	EBSKAN176	SPA	Feb-16	16.500
Atriplex semibaccata	EBSKAN177	SPA	Feb-16	3.200
Kennedia prostrata	EBSKAN178	SPA	Dec-16	0.055
Enchylaena tomentosa	EBSKAN180	SPA	Apr-17	2.900
Eucalyptus odorata	EBSKAN184	Kanmantoo mine site and surrounds	Jan-17	0.123
Kennedia prostrata	EBSKAN185	SPA	Nov-16	0.080
Enneapogon nigricans	EBSKAN186	Kanmantoo mine site and surrounds	Feb-17	4.000
Themeda triandra	EBSKAN189	SPA	Jan-17	1.500
Convolvulus erubens	EBSKAN190	SPA	Jan-15	1.450

Species	Batch number	Collection location	Collection date	Amount Sept 2018
Rytidosperma sp. (Danthonia)	EBSKAN191	SMA / SPA	Nov-16	36.500
Austrostipa sp.	EBSKAN193	SMA / SPA	Nov-16	20.000
Senna artimissioides	EBSKAN195	Kanmantoo mine site and surrounds	Dec-15	2.940
Bursaria spinosa	EBSKAN196	Kanmantoo mine site and surrounds	Feb-16	0.038
Bursaria spinosa	EBSKAN197	Kanmantoo mine site and surrounds	Feb-17	1.280
Rytidosperma sp. (Danthonia)	EBSKAN198	SMA	Nov-17	22.000
Austrostipa/Rytidosperma mix sp.	EBSKAN199	Mine rd SEB	Nov-17	324.000
Themeda triandra	EBSKAN200	SPA / SMA	Dec-17	56.000
Chloris truncata	EBSKAN201	SMA	Jan-18	7.500
Aristida behriana	EBSKAN202	SMA	Dec-17	0.800
Austrostipa blackii	EBSKAN204	surrounding area	Nov-17	1.900
Vittadinia sp. Mix	EBSKAN205	surrounding area	Nov-17	0.260
Eucalyptus leucoxylon	EBSKAN207	surrounding area	Feb-18	0.033
Chrysocephalum apiculatum	EBSKAN208	surrounding area	Dec-17	0.036
Kennedia prostrata	EBSKAN209	surrounding area	Nov-17	0.215
Lomandra effusa	EBSKAN210	surrounding area	Nov-17	0.450
Helichrysum leucopsideum	EBSKAN211	surrounding area	Nov-17	0.031
Arthropodium sp.	EBSKAN213	surrounding area	Nov-17	0.013
Olearia pannosa	EBSKAN214	surrounding area	Nov-17	0.022
Maireana brevifolia	EBSKAN215	surrounding area	Mar-18	0.600
Eucalyptus socialis	EBSKAN216	surrounding area	Feb-18	0.052
Eucalyptus calycogona	EBSKAN217	surrounding area	Feb-18	0.030
Allocasuarina verticillata	EBSKAN218	surrounding area	Dec-17	2.080
Dodonaea viscosa	EBSKAN219	surrounding area	Dec-17	2.510
Callitris gracillis	EBSKAN220	surrounding area	Dec-17	2.340

Species	Batch number	Collection location	Collection date	Amount Sept 2018
Acacia pycnantha	EBSKAN221	surrounding area	Dec-17	2.650
Bolboschoenus caldwellii	EBSKAN222	surrounding area	Nov-17	0.350
Lomandra effusa	EBSKAN223	surrounding area	Nov-17	0.400

Total **634.684**

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