

**FOUR MILE
ANNUAL FLORA SURVEY
SEPTEMBER 2007**

Prepared for
Quasar Resources Ltd

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Executive Summary

The first annual spring vegetation survey was carried out by Badman Environmental at the Four Mile prospect in September 2007. Seasonal conditions were quite dry at the time of the survey. Although good rainfall occurred during the first part of 2007, there was no follow-up rain in the months prior to the survey.

The survey used the same methodology as has been used at the nearby Beverley Uranium Mine for several years, although because this was the first annual survey comparisons could not be made between the 2007 data and data from previous years. It was also not possible to make comparisons between areas with differing land uses, as is done at Beverley. Because of this, data from the different landforms that were identified during the April 2007 baseline survey were compared to each other.

No threatened species were identified in the Four Mile area in September 2007. The incidence of alien species was also found to be very low at this time.

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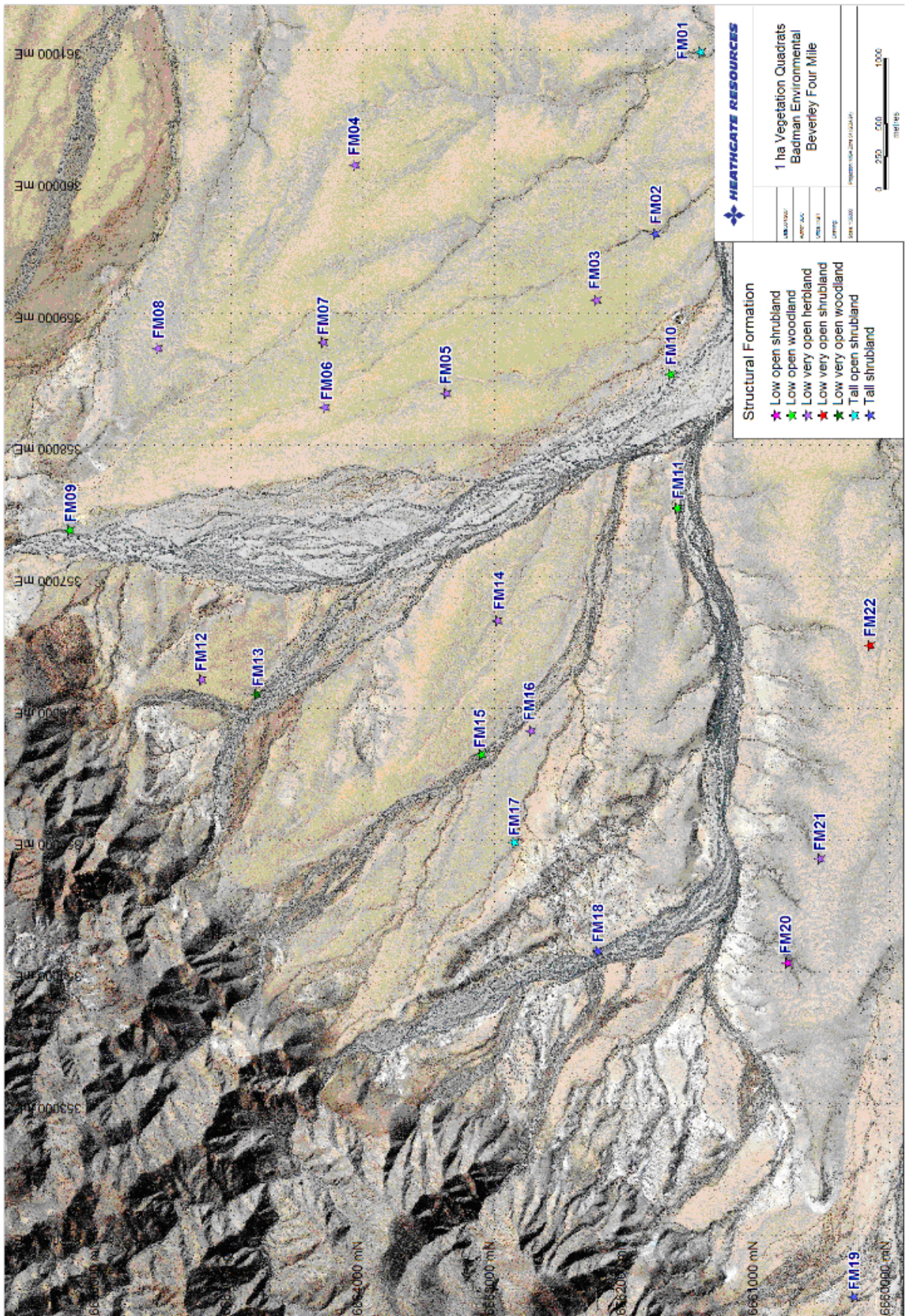


Figure 1: Study area and location of monitoring sites

Introduction

Quasar Resources Pty Ltd (Quasar), an affiliate of Heathgate Resources Pty Ltd (Heathgate), the Operators of the Beverley Uranium Mine, is investigating an area to the west of the existing Beverley operation for a potential new mine site. A baseline vegetation survey was carried out over this area in May 2007 (Badman 2007a) and 22 permanent vegetation monitoring sites were set up at that time (Figure 1). These sites included official DEH photopoint sites with associated one hectare quadrats, which were used as a baseline vegetation survey and also in determining the vegetation types that were present in the area. Smaller quadrats, measuring 5m x 2m, were also set up inside or adjacent to the one hectare quadrats, but these were not read at that time. This report details the first annual spring monitoring at these small quadrats. The locations of these sites and a brief description of their vegetation types are given in Table 1.

Project Overview

Environmental Setting

The Four Mile area, and the existing Beverley mine, are located on the Wooltana pastoral lease. Grazing of cattle for beef production has traditionally been the primary land use and this activity dates back to 1856 on Paralana Station, with sheep grazing on Wooltana Station from the same year (Heathgate Resources 1998).

The project is located on the eastern edge of the Northern Flinders subregion of the Interim Biogeographic Regionalisation for Australia (IBRA) Flinders Lofty Block bioregion (Neagle 2003). The study area covered in this report (Figure 1) is situated on a plain that abuts the foothills of the Flinders Ranges. It was once covered with *Astrelba pectinata* grassland, but because of a lack of significant summer rainfall since 2001 its vegetation is now dominated by short-lived perennial forbs, particularly *Sclerolaena* spp. This plain is dissected by a large watercourse, the Four Mile Creek. Paralana Creek lies just to the south of the present study area. Both creeks support riparian woodland dominated by *Eucalyptus camaldulensis* and *Melaleuca* spp., particularly *Melaleuca glomerata*. Both creeks flow from the Flinders Ranges and drain into Lake Frome. Several smaller watercourses flow into these major creeks. The minor watercourses support shrubland or low woodland vegetation with *Melaleuca glomerata*, several *Acacia*, *Eremophila* and *Senna* species or sub-species and several small tree or tall shrub species. These minor watercourses support a different vegetation type to that of the major creeks.

Although the whole area has a history of heavy grazing (Heathgate Resources 1998), the eastern part of the survey area is close to the Four Mile Bore stock watering point and has therefore been subject to heavier grazing than areas that are more distant from water. There is a now defunct watering point towards the south of the area and stock grazing on the north-western parts probably watered at the Paralana hot springs, which are just outside the survey area on its north-western side. Past disturbance of the survey area has been mainly from grazing by domestic livestock and kangaroos, fence and track construction, and some limited off-road driving. The majority of the latter, prior to the current mining exploration activities, has been associated with stock mustering activities.

Table 1: Location and description of new monitoring sites

Coordinates are AMG Zone 54. Datum is WGS84.

Beverley Site No.	DEH Photo-point Disc No.	North End		Bear- ing ¹	Structural Formation
		Easting	Northing		
FM01	11106	360982	6661440	176	Tall open shrubland
FM02	11107	359600	6661787	145	Tall shrubland
FM03	11108	359098	6662235	205	Low very open herbland
FM04	11109	360119	6664062	210	Low very open herbland
FM05	11110	358389	6663374	216	Low very open herbland
FM06	11111	358283	6664289	176	Low very open herbland
FM07	11112	358777	6664303	180	Low very open herbland
FM08	11113	358731	6665559	175	Low very open herbland
FM09	11114	357351	6666232	238	Low open woodland
FM10	11115	358536	6661671	200	Low open woodland
FM11	11116	357520	6661618	200	Low open woodland
FM12	11117	356214	6665227	180	Low very open herbland
FM13	11118	356105	6664811	178	Low very open woodland
FM14	11119	356664	6662981	180	Low very open herbland
FM15	11120	355646	6663108	198	Low open woodland
FM16	11121	355827	6662726	182	Low very open herbland
FM17	11122	354980	6662853	190	Tall open shrubland
FM18	11123	354155	6662223	166	Tall shrubland
FM19	11124	351530	6660280	180	Tall shrubland
FM20	11125	354065	6660785	180	Low open shrubland
FM21	11126	354855	6660538	156	Low very open herbland
FM22	11127	356476	6660156	176	Low very open shrubland

Threatened Species

Overview

The majority of the Four Mile area lies within the Eastern Botanic Region (EA) as defined by Barker *et al.* (2005). The western part of the Four Mile survey area, west of site FM15 is within the Flinders Ranges Botanic Region (FR). The number of threatened species reported by Barker *et al.* (2005) for these two regions is summarised in Table 2. This table clearly shows that many more threatened species occur in the Flinders Ranges Botanic Region than in the Eastern Botanic Region. In the Flinders Ranges, many species are restricted to the ranges themselves, particularly to damp areas in gullies and at higher elevations, and are therefore unlikely to be found in the present survey area.

¹ Bearing is the direction of the sighter peg from the photopoint peg.

Table 2: Summary of Numbers of Threatened Species in Four Mile and Beverley Areas

	FR	EA	FR + EA
Endangered	13	3	15
Vulnerable	32	12	39
Rare	87	35	98
Total	132	50	152

Results of Previous Surveys in this Area

No species listed under the EPBC Act has been reliably recorded at the Four Mile Prospect or near the Beverley Mine site.

Only one threatened species whose presence is supported by a voucher specimen in the State Herbarium of South Australia is currently known to occur in the immediate Beverley Mine area. This is *Swainsona oligophylla*, which is listed as rare under the South Australian National Parks and Wildlife Act, 1972. This species was recorded on three occasions in October 2005 and three voucher collections (F.J. Badman 11752, 11759 and 11767) were lodged with the State Herbarium of South Australia. These records followed good winter rainfall in 2005 (Badman 2005, 2006a) and were from sites on the gibber plains, including in a small gully, and along the Epic Gas Pipeline. Soils ranged from clay to clay-loam and sandy clay-loam. All records are from east of the Four Mile area.

The possibility of other threatened species being present in this area is discussed in detail by Badman (2006b, 2007b). The presence of two threatened species that were mentioned in the Beverley Baseline vegetation survey (Heathgate Resources 1998) has now been dismissed as erroneous due to these records being outside their known verified distribution, a lack of voucher specimens and records based on vegetative material (Badman 2006b).

Threatened Species Known to Occur in the General Area

Threatened species that have been reliably recorded in the general vicinity of the Four Mile and Beverley areas and in similar habitat, i.e. within about 100km but excluding the Flinders Ranges, are listed in Table 3. Only those species whose presence is supported by herbarium voucher collections are included in this list. Individual species are discussed below. Many other threatened species are present in the adjacent ranges, but will not be found at Beverley due to lack of suitable habitat. Some species that have been mentioned in early reports on the vegetation and flora of the Beverley area but which are not supported by voucher collections and whose habitat does not occur on the plains are not included here.

The only species that is officially listed as threatened that has been reliably recorded near the Four Mile area is *Swainsona oligophylla*. This species is listed as rare in South Australia (Lang and Kraehenbuehl 2006) but is not listed under the EPBC Act. It was collected at the Beverley Mine one hectare quadrat at BU15 in September 2005 (FJB 11752) and also near the control site at monitoring site 7 along the Epic Gas Pipeline corridor (FJB 11767) following good winter rainfall in 2005. This plant was

listed as being uncommon at both sites at this time, but it has not been recorded during subsequent monitoring events (Badman 2007b). The BU15 site is on the Beverley Mine Lease but is well away from areas proposed for any development. The area near the Epic Pipeline will not be disturbed by any actions of Quasar Resources.

Table 3: Summary of likely occurrence of threatened plants in the survey area

Likelihood of occurring in this area is based on information from the South Australian Plant Mapper (Web Ref. 1).

Threatened species ratings

E	Endangered (SA NPW Act)
V	Vulnerable under the SA NPW Act
R	Rare under the SA NPW Act

Threatened species recorded within 100 km of the Four Mile survey area

Species	Family	EPBC Rating	State Rating	Likelihood of occurrence
<i>Aristida arida</i>	Gramineae	Not rated	R	Possible
<i>Austrodanthonia tenuior</i>	Gramineae	Not rated	R	Possible
<i>Cladium procerum</i>	Cyperaceae	Not rated	R	Unlikely
<i>Eremophila subfloccosa</i> ssp. "glandulosa"	Myoporaceae	Not rated	R	Unlikely
<i>Orobanche cernua</i> var. <i>australiana</i>	Orobanchaceae	Not rated	R	Possible
<i>Ranunculus sessiliflorus</i> var. <i>pilulifera</i>	Ranunculaceae	Not rated	V	Unlikely
<i>Solanum eremophilum</i>	Solanaceae	Not rated	R	Possible
<i>Swainsona oligophylla</i>	Leguminosae	Not rated	R	Recorded 2005
<i>Swainsona procumbens</i>	Leguminosae	Not rated	V	Possible
<i>Swainsona viridis</i>	Leguminosae	Not rated	V	Possible
<i>Zygophyllum hybridum</i>	Zygophyllaceae	Not rated	R	Possible

Threatened Ecological Communities

The baseline vegetation study of the Four Mile area (Badman 2007a) concluded that this area does not include any threatened vegetation community as listed by Davies (1982) or Neagle (1995). No such community has been recorded during previous baseline surveys in the Beverley area (Close and Williams 1982, Heathgate Resources 1998, Badman 2006a).

Naturalised Plants

The Four Mile baseline vegetation survey (Badman 2007a) identified eight introduced species, or less than six percent of the total number of species recorded during that survey. Following a dedicated weed survey of the Beverley Mine Lease and adjacent pastoral land, Badman (2006b) listed a cumulative total of 18 introduced plant species at the Beverley Mine site. This represented only nine percent of the total species list at that time. The number of aliens recorded at Beverley has now increased to 19 but due to the recording of additional native species this now represent only seven percent of the total list of 263 species. This is well below the 10% listed by Badman (1995, 1999) as being a typical percentage of naturalised plants on South Australian arid zone plant lists that have been collated over several years. It is still less than the percentage of naturalised taxa (11%) derived from

Barker *et al.* (2005) for the Eastern Botanic Region and well below the 20% figure derived from the same source for the Flinders Ranges Botanic Region. The low number of alien species recorded from the Beverley area is perhaps surprising given the ease of access along major creek lines for seeds from the Flinders Ranges.

Proclaimed Species

Only one proclaimed species has been recorded in the Beverley area: this is *Tribulus terrestris*. Five other proclaimed species have been recorded in the general area, particularly in the nearby Flinders Ranges, and could be found at Beverley sometime in the future. These six species are:

Tribulus terrestris (Caltrop)

This species has been recorded in Beverley Uranium Mine monitoring quadrats in some years but has been absent in many others. This species is common in surrounding pastoral country following good rainfall.

Asphodelus fistulosus (Onion Weed)

This species had not yet been recorded in the Beverley area, but is common in the Flinders Ranges. It could be introduced to the area by water flows along Four Mile Creek or Paralana Creek. There is a nearby herbarium record from Frome Downs (Web Ref. 1).

Echium plantagineum (Salvation Jane)

This species had not yet been recorded in the Beverley area, but is common in the Flinders Ranges. It could be introduced to the area by water flows along Four Mile Creek or Paralana Creek. There are nearby herbarium records from Chambers Gorge and Martins Well (Web Ref. 1).

Emex australis (Three-corner Jack)

This species has yet to be recorded in the Beverley area, but is widely distributed in the Flinders Ranges. There is also a herbarium collection from Chambers Gorge (Web Ref. 1). It could be introduced to the Beverley area along one of the creeks from the ranges, or be brought in on vehicle tyres.

Marrubium vulgare (Horehound)

This species has yet to be recorded in the Beverley area, but is widely distributed in the Flinders Ranges. It could be introduced to the Beverley area along one of the creeks from the ranges, or by seeds in the coats of animals.

Xanthium spinosum (Bathurst Burr)

This species has yet to be recorded in the immediate Beverley area, but is widely distributed in the Flinders Ranges. It could be introduced to the Beverley area along one of the creeks from the ranges. There is a nearby record from North Mulga (Web Ref. 1) and it is most commonly associated with station dams in northern parts of South Australia.

Vegetation Groups

Three vegetation groups were identified in the Four Mile area during the baseline vegetation survey (Badman 2007a). These are described below.

Group 1

Group 1 contains sites along the major channels of Four Mile Creek and its tributaries. Overstorey vegetation is dominated by *Melaleuca glomerata* and *Eucalyptus camaldulensis*, which occurs along the channel banks and on higher ground between the channels. The shrubs *Acacia tetragonophylla* and *Eremophila freelingii* dominate the mid storey. The grasses *Triodia irritans*, *Enteropogon ramosus* and *Aristida nitidula* are common in the understorey, together with the shrubs *Rhagodia spinescens* and *Enchylaena tomentosa* and the forbs *Ptilotus obovatus*, *Sclerolaena cuneata* and *S. diacantha*. The introduced *Sisymbrium erysimoides* was also found to be common here, although it was identified only from dead plants that had already shed their seeds. *Triodia irritans* decreases in abundance with distance from the ranges.

Group 2

Group 2 contains sites situated along minor watercourses as well as some tributaries of Four Mile Creek.

Upper storey vegetation is dominated by the tall shrubs *Acacia tetragonophylla* and *Eremophila freelingii*, with *Santalum lanceolatum* also fairly common. *Eremophila duttonii* often occurs at the margins of the watercourses. The most common understorey species are *Enchylaena tomentosa*, *Ptilotus obovatus*, *Sclerolaena cuneata*, *S. longicuspis* and *Senna artemisioides* ssp. *sturtii*.

Group 3

Group 3 contains all of the tableland sites. These sites form a much tighter group than the sites that make up the other two groups (Badman 2007a), indicating more uniformity between sites in this landform.

Very few shrubs occur at sites in this group and they are not sufficiently common to form a dominant part of the vegetation. Vegetation is dominated by *Sclerolaena* spp., particularly *S. divaricata*, *S. intricata* and *S. longicuspis*, with *S. ventricosa* also present at many sites. Other common species are *Neobassia proceriflora* and the herbs *Calotis hispidula*, *Daucus glochidiatus* and *Euphorbia stevenii*.

The summer-growing grass *Astrebla pectinata* should form the overstorey in this type of country (Fatchen Environmental 1998, 2001), but it has been in decline since peak cover values were recorded in 2000 (Table 4). It is now present only as scattered butts, with no leaf material recorded at any site in the April 2007 survey area. It is now unclear whether any of these butts will regenerate following suitably heavy summer rainfall, or whether it will need to regenerate from seed in the soil seedbank.

Table 4: Cover values for *Astrebla pectinata* at Beverley Monitoring Sites

Source: Beverley Uranium Mine Annual Vegetation Monitoring Reports. Percentage cover values from tableland monitoring sites with *Astrebla pectinata*.

Site No	1998	2000	2001	2002	2003	2004	2005	2006	Mean
BU01	5.3	11.2	6.2	2.6	2.7	2.3	2.1	1.2	4.2
BU04	1.1	5.7		1.9	0.7	0.7	0.7	0.7	1.6
BU06	5.2	16.6	9.7	4.4	3.1	3.2	2.9	1.7	5.9
BU07	4.8	10.1	4.3	3.0	1.8	1.5	1.0	0.8	3.4
BU09	5.7	13.2	0	3.9	3.4	2.2	2.0	1.3	4.0
BU15	6.0	15.1	10.9	0	3.4	2.8	1.7	1.0	5.1
BU20	6.1	20.7	11.3	0	6.0	2.1	2.1	1.2	6.2
Mean	4.9	13.2	7.1	2.3	3	2.1	1.8	1.1	4.4

Methods

Field Survey

Timing and Setting.

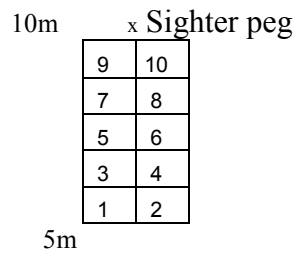
The first annual vegetation monitoring at the Four Mile prospect was undertaken in conjunction with annual monitoring at the Beverley Mine from 1-15 September 2007. Monitoring was carried out on behalf of Quasar Resources by Dr Frank Badman of Badman Environmental, with assistance from Evan Badman.

Data Collection and analysis

Data collection and analytical techniques are based on those used at the Beverley Mine (Heathgate Resources 1998). These are firstly intended to detect disturbance, whether natural or a consequence of development. Photographic capture of impacts or alterations is the primary technique. Secondly, the photographs themselves allow the detection of changes in gross plant community composition and structure. The photopoint quadrats allow a more detailed localised following of plant community composition, species richness and cover of individual species, particularly increase or reduction of the perennial species which contribute to landscape stability. Means for doing so include:

- Qualitative data from visual information from photographs. These include:
 - presence/absence of disturbance such as tyre marks, hoof prints, and construction activities;
 - increases or decreases in bare ground;
 - increases or decreases in erosional processes such as gullyng, sedimentation, and soil drift;
 - mortality, recruitment and changes in health of perennial plants, particularly larger shrubs and tree species not usually present in quadrats.
- Quantitative data from visual information in photographs and primarily trends in cover or biomass of main species over time.
- Quantitative data on plant community composition and cover from quadrat information.

The location of quadrats is shown in Figure 1 and their layout in Figure 2. A tape is laid out from the photopoint peg to the sighter peg and two other tapes are laid out one metre on either side of the central tape and parallel to it. The quadrat begins at a point five metres from the photopoint peg and extends for five metres to the sighter peg. Cells are laid out in two rows, one on either side of the central tape. Cover values for each species present are estimated for the ten 1m x 1m cells, in the order shown in Figure 2, and recorded on an appropriate data sheet. No other calculations are carried out in the field.



* Photopoint peg

Figure 2: Layout of photopoint quadrat and cell numbering system

Raw field data are transferred to a computer spreadsheet and calculations on species richness and cover values for each site and for each vegetation class are then carried out (Appendix A).

The baseline one hectare monitoring sites were chosen on the basis of vegetation type and landform, but also attempted to obtain representative coverage of the whole of the Four Mile area (Badman 2007a). The 5m x 2m quadrats have generally been set up within the one hectare quadrats except at major creek sites, where they are generally set up to the north of the DEH photopoint peg.

Searches for threatened species were carried out at all quadrats as part of the monitoring schedule and opportunistically in other likely areas (see section on “Threatened Species and Communities”).

Site photography is carried out by Heathgate Resources environmental staff and does not form part of this survey.

Data Analysis

The main data analysis tools used to examine the baseline Beverley Four Mile data were ordination and classification (Badman 2007a). Ordination of the site data was carried out using the PC-Ord computer software package (McCune and Mefford 1999) and classification using the PATN software package (Belbin 1992).

These methods are too coarse to detect small changes in vegetation that may be caused by operational activities or by variations in rainfall or other climatic events. Analysis of data from the 5m x 2m quadrats allows the detection of small changes in vegetation cover and species richness, but this is not possible from a single set of data. Once more data are available, values for species richness and cover will be presented as graphs as has been done at the Beverley Mine for several years.

In this report, mean data from the three vegetation groups are summarised and compared to data from the other groups. In future reports, data from each site will be compared with previous years' data from that site and the results presented as graphs, but this is not yet possible because only one set of data from the 5m x 2m quadrats is presently available.

Data are graphed here on the basis of landform, but this form of presentation may have to change once the mine becomes operational. At Beverley, sites are grouped under impact zone, i.e. development areas, Mine Lease outside development areas and pastoral sites. A similar approach may be appropriate at the Four Mile after mining commences.

Results

General

Seasonal Conditions

Rainfall in the 12 months preceding this survey was only 70 mm, of which 44.6 mm fell during May. Only 0.4 mm fell in three months following this rainfall event prior to the 2007 survey (Beverley Mine rainfall records).

The closest station for which long term rainfall records are available is Wooltana, which has a mean annual rainfall of 192 mm (Heathgate Resources 1998). Rainfall for the period between the 2004 and 2007 vegetation monitoring events at Beverley (Badman 2007b) lies within the lowest decile for this area (Heathgate Resources 1998). The condition of vegetation at the Quasar Resources prospect reflected this at the time of both the baseline and the first annual surveys.

General Health of the Vegetation

Despite the dry seasonal conditions, most perennial vegetation was in fairly good condition at the time of the survey, although few of the shrub species were in a reproductive state.

The condition of *Astrebla pectinata* in September 2007 continues to be of some concern. The lack of summer rainfall in recent years has resulted in a serious deterioration in the cover of this species (Table 4). Many plants have now reached the stage where they are present only as root material exposed on the surface of the ground. Some (or many) of these may have passed the point from which they will regenerate from this root material. This has been the case at the adjacent Beverley monitoring sites for at least the last three years, with the situation becoming worse each year.

Threatened Species Recorded During the Field Survey

No threatened species were recorded during the April 2007 field survey. There is only one record of a threatened species that is supported by a voucher collection in the State Herbarium of South Australia from the Beverley Mine area. This is *Swainsona oligophylla*, which is listed as Rare under the National Parks and Wildlife Act, 1992 and was recorded three times in a single year following significant winter rainfall (Badman 2006b). It has not been recorded from this area in any other year.

Analysis of Field Data

Mean values for species richness for the 22 monitoring sites are summarised for the three vegetation groups (landforms) in Figure 3. Mean cover values for these groups are shown in Figure 4.

Species Richness

Species richness is the number of species recorded at each site. The mean species richness for sites in each landform is shown in Figure 3. Species richness is shown for both total species present and for perennial species.

Despite the apparent lack of cover on the plains, this landform actually contains the highest number of species, particularly of annual and ephemeral species. Mean species richness is likely to vary more in this landform (Vegetation Group 3) because of this prevalence of short-lived species. Minor watercourses (Vegetation Group 2) have the second highest species richness, both of perennials and short-lived species. Major watercourses (Vegetation Group 1) might be expected to have the highest species richness, but monitoring sites have been set up on the edge of the creek and generally miss the tall trees and the largest shrubs, which form the densest perennial vegetation and which grow in the channels.

The major creek 5m x 2m quadrats were set up in this manner for three reasons: firstly the actual channels are usually devoid of any vegetation; secondly, the marker pegs would be swept away in each flood if they were placed in the channels themselves; and thirdly it was done to be consistent with the way these quadrats were set out at major creek sites at Beverley.

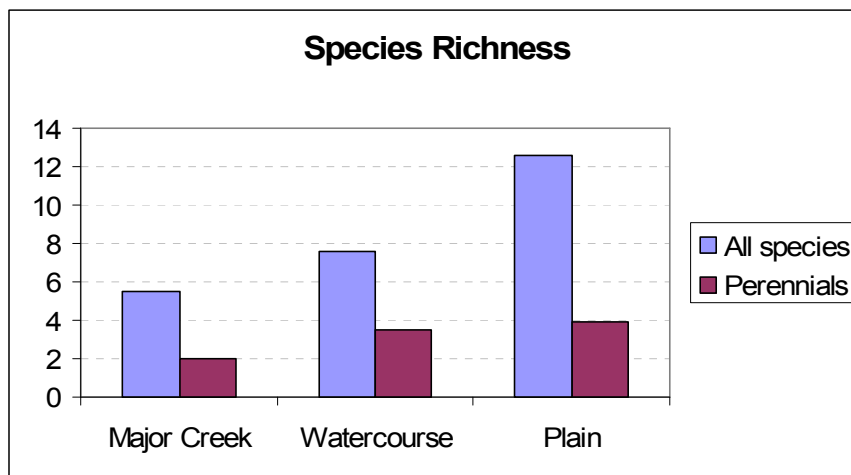


Figure 3: Mean species richness for sites in each landform

Cover Values

The mean cover values for sites in each landform are shown in Figure 4. Cover values are shown for both total species present and for perennial species.

The highest cover values were recorded at sites along minor watercourses and the lowest along at major creek sites. The reasons for the lowest values at major creek sites are connected to the placement of quadrats and are discussed in the previous section. Minor flows that have provided extra water subsidies, together with the greater number of tall shrubs present in this landform, are responsible for the higher cover values along minor watercourses. The plains sites, despite containing a large number of species, generally had low cover values because of the dryness of the season and the general lack of any run-on water subsidies.

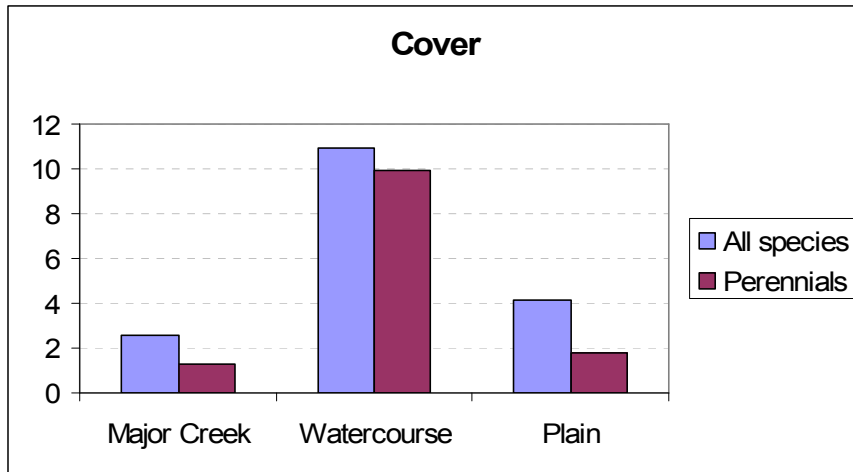


Figure 4: Mean cover values for sites in each landform

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APPENDICES

Appendix A: Clean Data and Individual Analysis Sheets for September 2007 Quadrat Data

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM01		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Eremophila duttonii	Long-lived perennial shrub			50		70						60	18.0	
Sclerolaena divaricata	Biennial shrub/subshrub		1										0.1	
Sclerolaena longicuspis	Biennial shrub/subshrub						1						0.1	
Calotis hispidula	Ephemeral/annual		1										0.1	
Zygophyllum iodocarpum	Ephemeral/annual		1										0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	0.7	5
Perennials/biennials	0.5	3
Ephemerals	0.2	2

Total Density Long-lived Perennial Shrubs	0
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COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	18.0	Long-lived perennial	18.0
Shrub/subshrub	0.2	Biennial	0.2
Grass	0	Ephemeral/annual	0.2
Herb	0.2	All species	18.4
Shrubs & trees	18.0	All perennials	18.2
Grasses & herbs	0.2		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM02		September 2007									
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density
		1	2	3	4	5	6	7	8	9	10		
Eremophila duttonii	Long-lived perennial shrub							5		100	25	13.0	1
Senna artemisioides oligophylla	Long-lived perennial shrub										1	0.1	
Eragrostis setifolia	Long-lived perennial grass								1			0.1	
Ptilotus obovatus	Biennial shrub/subshrub			1				1				0.2	
Sclerolaena intricata	Biennial shrub/subshrub				1	1						0.2	
Sclerolaena lanicuspis	Biennial shrub/subshrub					1						0.1	
Sclerolaena longicuspis	Biennial shrub/subshrub	1	1	10		1			2		5	2.0	
*Acetosa vesicaria	Ephemeral/annual								1			0.1	
Arabidella nasturtium	Ephemeral/annual			1	1							0.2	
Calotis hispidula	Ephemeral/annual					1	1					0.2	
Crinum flaccidum	Ephemeral/annual										1	0.1	
Gnephosis arachnoidea	Ephemeral/annual					1	1					0.2	
Goodenia pinnatifida	Ephemeral/annual	1	1	1		2	1		1			0.7	
Leiocarpa leptolepis	Ephemeral/annual				1							0.1	
Lepidium phlebopetalum	Ephemeral/annual		1	1	1	1	1					0.5	
Minuria leptophylla	Ephemeral/annual										1	0.1	
Pimelea simplex	Ephemeral/annual								1			0.1	
Plantago drummondii	Ephemeral/annual					1						0.1	
Rhodanthe microglossa	Ephemeral/annual		1	1	1	1	1		1			0.6	
Senecio glossanthus	Ephemeral/annual			1	1	1			1			0.4	
Solanum ellipticum	Ephemeral/annual	2									1	0.3	
Stenopetalum lineare	Ephemeral/annual		1		1	1	1		1		1	0.6	
Streptoglossa adscendens	Ephemeral/annual				1	1	1					0.3	
Vittadinia eremaea	Ephemeral/annual						1					0.1	
Grass ephemeral	Ephemeral/annual grass							1		1		0.2	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	6.3	25
Perennials/biennials	1.6	7
Ephemerals	4.7	18

Total Density Long-lived Perennial Shrubs	1
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COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	13.1	Long-lived perennial	13.2
Shrub/subshrub	2.5	Biennial	2.5
Grass	0.3	Ephemeral/annual	4.9
Herb	4.7	All species	20.6
Shrubs & trees	13.1	All perennials	15.7
Grasses & herbs	5.0		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM03		September 2007									
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density
		1	2	3	4	5	6	7	8	9	10		
Astrebla pectinata	Long-lived perennial grass	1		1		1	1			1		0.5	
Neobassia proceriflora	Biennial shrub/subshrub				1				1			0.2	
Sclerolaena divaricata	Biennial shrub/subshrub	1			1					5		0.7	
Sclerolaena ventricosa	Biennial shrub/subshrub									1		0.1	
Arabidella nasturtium	Ephemeral/annual	1		1	1	1				1		0.5	
Convolvulus remotus	Ephemeral/annual				1							0.1	
Lepidium phlebopetalum	Ephemeral/annual									1		0.1	
Rhodanthe floribunda	Ephemeral/annual				1				5	5	1	1.2	
Salsola kali	Ephemeral/annual	1					1		1	1	1	0.5	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	2.7	9
Perennials/biennials	1.5	4
Ephemerals	1.2	5
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
	Tree/tall shrub		0
Shrub/subshrub	1.0	Biennial	1.0
Grass	0.5	Ephemeral/annual	2.4
Herb	2.4	All species	3.9
Shrubs & trees	0	All perennials	1.5
Grasses & herbs	2.9		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM04		September 2007									
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density
		1	2	3	4	5	6	7	8	9	10		
Astrebla pectinata	Long-lived perennial grass	1	1	1		1	1	1	1		1	0.8	
Neobassia proceriflora	Biennial shrub/subshrub			1	1	1	1				5	0.9	
Sclerolaena divaricata	Biennial shrub/subshrub			1							1	0.2	
Arabidella nasturtium	Ephemeral/annual		1	2	2	1	1				1	1	0.9
Cullen sp.	Ephemeral/annual			1									0.1
Euphorbia stevenii	Ephemeral/annual			1							1		0.2
Lepidium phlebopetalum	Ephemeral/annual				1								0.1
Omphalolappula concava	Ephemeral/annual			1			1						0.2
Rhodanthe floribunda	Ephemeral/annual			1							1		0.2
Salsola kali	Ephemeral/annual		1		1	1						1	0.4
Vittadinia eremaea	Ephemeral/annual			1									0.1
Zygophyllum iodocarpum	Ephemeral/annual			1									0.1

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	3.6	12
Perennials/biennials	1.5	3
Ephemerals	2.1	9

Total Density Long-lived Perennial Shrubs	0
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COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.8
Shrub/subshrub	0.7	Biennial	1.1
Grass	0.8	Ephemeral/annual	2.3
Herb	2.3	All species	4.2
Shrubs & trees	0	All perennials	1.9
Grasses & herbs	0.8		

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BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM05		September 2007									
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density
		1	2	3	4	5	6	7	8	9	10		
Astrebla pectinata	Long-lived perennial grass	1	1						1			0.3	
Malacocera albolanata	Biennial shrub/subshrub						1				1	0.2	
Neobassia proceriflora	Biennial shrub/subshrub			1								0.1	
Sclerolaena divaricata	Biennial shrub/subshrub	5			1			1	1			0.8	
Sclerolaena ventricosa	Biennial shrub/subshrub	10	1	2	1	1	1	2	1	2	2	2.3	
Arabidella nasturtium	Ephemeral/annual	1		1	1				1			0.4	
Bulbine alata	Ephemeral/annual	1		1	1	1	1	1	1			0.7	
Calotis hispidula	Ephemeral/annual	1	1	1	1	1		2			2	0.9	
Euphorbia stevenii	Ephemeral/annual				1	1						0.2	
Lepidium phlebopetalum	Ephemeral/annual	1		1	1		1	1	1			0.6	
Lotus cruentus	Ephemeral/annual		1				1					0.2	
Pimelea simplex	Ephemeral/annual	1						1	1			0.3	
Plantago drummondii	Ephemeral/annual	1		1	1	1	1	1			1	0.7	
Rhodanthe floribunda	Ephemeral/annual	1						1	1		5	0.8	
Rhodanthe microglossa	Ephemeral/annual	1										0.1	
Salsola kali	Ephemeral/annual		1		1						1	0.3	
Senecio glossanthus	Ephemeral/annual		1	1	1		1		1			0.5	
Swainsona sp.	Ephemeral/annual								1		1	0.2	
Streptoglossa adscendens	Ephemeral/annual	1										0.1	
Vittadinia eremaea	Ephemeral/annual	1			1						1	0.3	
Zygophyllum iodocarpum	Ephemeral/annual			1								0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	7.8	21
Perennials/biennials	2.0	5
Ephemerals	5.8	16

Total Density Long-lived Perennial Shrubs	0
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COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.3
Shrub/subshrub	3.4	Biennial	3.4
Grass	0.3	Ephemeral/annual	6.4
Herb	6.4	All species	10.1
Shrubs & trees	0	All perennials	3.7
Grasses & herbs	6.7		

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BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM06		September 2007									
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density
		1	2	3	4	5	6	7	8	9	10		
Astrebla pectinata	Long-lived perennial grass	1							1		1	0.3	
Neobassia proceriflora	Biennial shrub/subshrub			1	1						1	0.3	
Sclerolaena divaricata	Biennial shrub/subshrub			1		1						0.2	
Sclerolaena ventricosa	Biennial shrub/subshrub	1	1	2	1	5		1	1	1	1	1.4	
Arabidella nasturtium	Ephemeral/annual	1		1	1	1		1		1		0.6	
Arabidella trisecta	Ephemeral/annual									1		0.1	
Bulbine alata	Ephemeral/annual					1				1		0.2	
Calotis hispidula	Ephemeral/annual			1						1		0.2	
Convolvulus remotus	Ephemeral/annual									1		0.1	
Cullen sp.	Ephemeral/annual				1	1				1		0.3	
Erodium carolinianum	Ephemeral/annual					1						0.1	
Euphorbia stevenii	Ephemeral/annual							1				0.1	
Lepidium phlebopetalum	Ephemeral/annual					1						0.1	
Nicotiana simile	Ephemeral/annual						1					0.1	
Pimelea simplex	Ephemeral/annual			1	1							0.2	
Plantago drummondii	Ephemeral/annual						1					0.1	
Rhodanthe floribunda	Ephemeral/annual			1				1				0.2	
Senecio glossanthus	Ephemeral/annual							1				0.1	
Vittadinia eremaea	Ephemeral/annual					1		1		1		0.3	
Zygophyllum iodocarpum	Ephemeral/annual		1		1	1		1	1			0.5	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	5.0	20
Perennials/biennials	1.7	4
Ephemerals	3.3	16

Total Density Long-lived Perennial Shrubs	0
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COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.3
Shrub/subshrub	1.9	Biennial	1.9
Grass	0.3	Ephemeral/annual	3.3
Herb	3.3	All species	5.5
Shrubs & trees	0	All perennials	2.2
Grasses & herbs	3.6		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM07		September 2007									
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density
		1	2	3	4	5	6	7	8	9	10		
Astrebla pectinata	Long-lived perennial grass	1	1	1	1		1	1	1	1		0.8	
Neobassia proceriflora	Biennial shrub/subshrub	1		1		1				1	1	0.5	
Sclerolaena intricata	Biennial shrub/subshrub					1					2	0.3	
Sclerolaena ventricosa	Biennial shrub/subshrub	2		1	1	1				1		0.6	
Arabidella nasturtium	Ephemeral/annual	1			1	1					1	0.4	
Bulbine alata	Ephemeral/annual	1								1	1	0.3	
Calotis hispidula	Ephemeral/annual										1	0.1	
Cullen sp.	Ephemeral/annual			1	1						1	0.3	
Euphorbia stevenii	Ephemeral/annual			1							1	0.2	
Lepidium phlebopetalum	Ephemeral/annual										1	0.1	
Nicotiana simile	Ephemeral/annual	1		1		1					1	0.4	
Plantago drummondii	Ephemeral/annual	2		1		1				1		0.5	
Rhodanthe floribunda	Ephemeral/annual	1			1						1	0.3	
Salsola kali	Ephemeral/annual			1	1							0.2	
Senecio glossanthus	Ephemeral/annual	1								1		0.2	
Stenopetalum lineare	Ephemeral/annual				1							0.1	
Vittadinia eremaea	Ephemeral/annual			1							1	0.2	
Zygophyllum iodocarpum	Ephemeral/annual					1						0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	5.3	18
Perennials/biennials	2.0	4
Ephemerals	3.3	14
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.8
Shrub/subshrub	1.4	Biennial	1.4
Grass	0.8	Ephemeral/annual	3.4
Herb	3.4	All species	5.6
Shrubs & trees	0	All perennials	2.2
Grasses & herbs	4.2		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM08		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Astrebla pectinata	Long-lived perennial grass				1	1				1			0.3	
Neobassia proceriflora	Biennial shrub/subshrub	2		1			1	1			1		0.6	
Sclerolaena divaricata	Biennial shrub/subshrub			1			1						0.2	
Arabidella nasturtium	Ephemeral/annual	1		1									0.2	
Bulbine alata	Ephemeral/annual	1		1			1				1		0.4	
Calotis hispidula	Ephemeral/annual	1	1	1			1				1		0.5	
Cullen sp.	Ephemeral/annual	1		1			1	1			1		0.5	
Euphorbia stevenii	Ephemeral/annual			1									0.1	
Rhodanthe floribunda	Ephemeral/annual	1	1	1									0.3	
Rhodanthe pygmaea	Ephemeral/annual							1					0.1	
Senecio glossanthus	Ephemeral/annual	1	1	1			1	1			1		0.6	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	3.7	11
Perennials/biennials	1.0	3
Ephemerals	2.7	8

Total Density Long-lived Perennial Shrubs	0
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COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.3
Shrub/subshrub	0	Biennial	0.8
Grass	0.3	Ephemeral/annual	2.7
Herb	2.7	All species	3.8
Shrubs & trees	0	All perennials	1.1
Grasses & herbs	3.0		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM09		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Sclerolaena divaricata	Biennial shrub/subshrub											1	0.1	
Sclerolaena ventricosa	Biennial shrub/subshrub				1				1				0.2	
Gnephosis eriocarpa	Ephemeral/annual	1	2	1	1	1	1	1	1	1			0.9	
Tetragonia sp.	Ephemeral/annual		1	5	1	2			1	1		1	1.2	
Tripogon loliiformis	Ephemeral grass						1						0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	1.9	5
Perennials/biennials	0.3	2
Ephemerals	1.6	3
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0
Shrub/subshrub	0.3	Biennial	0.3
Grass	0.1	Ephemeral/annual	2.2
Herb	2.1	All species	2.5
Shrubs & trees	0	All perennials	0.3
Grasses & herbs	2.2		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM10		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Astrebla pectinata	Long-lived perennial grass	1											0.1	
Dissocarpus paradoxus	Biennial shrub/subshrub	1	1	5	1	1	1	1	1	1	1	1	1.4	
Sclerolaena ventricosa	Biennial shrub/subshrub			1			2						0.3	
*Acetosa vesicaria	Ephemeral/annual			1	1	1	1					1	0.5	
Erodium sp.	Ephemeral/annual			1									0.1	
Salsola kali	Ephemeral/annual			1				1					0.2	
*Schismus barbatus	Ephemeral/annual			1		1					1		0.3	
Tetragonia sp.	Ephemeral/annual				1	1	1	1	1	1	1		0.6	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	3.0	8
Perennials/biennials	1.3	3
Ephemerals	1.7	5
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.1
Shrub/subshrub	1.7	Biennial	1.7
Grass	0.1	Ephemeral/annual	1.7
Herb	1.7	All species	3.5
Shrubs & trees	0	All perennials	1.8
Grasses & herbs	1.8		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM11		September 2007									
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density
		1	2	3	4	5	6	7	8	9	10		
Sclerolaena brachyptera	Biennial shrub/subshrub		1	1			1	1	1	1	1	0.7	
Sclerolaena divaricata	Biennial shrub/subshrub						5		5		1	1.1	
Sclerolaena ventricosa	Biennial shrub/subshrub		1	1		5	1	1	1	1	1	1.2	
Calotis hispidula	Ephemeral/annual						1					0.1	
Salsola kali	Ephemeral/annual						1					0.1	
Tetragonia sp.	Ephemeral/annual			1		1	1	1	1	1	1	0.7	
Zygophyllum iodocarpum	Ephemeral/annual			1						1		0.2	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	2.9	7
Perennials/biennials	1.8	3
Ephemerals	1.1	4
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0
Shrub/subshrub	3.0	Biennial	3.0
Grass	0	Ephemeral/annual	1.1
Herb	1.1	All species	4.1
Shrubs & trees	0	All perennials	3.0
Grasses & herbs	1.1		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM12		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Astrebla pectinata	Long-lived perennial grass	1			1	1	1	1	1	1	1		0.7	
Neobassia proceriflora	Biennial shrub/subshrub	1		1		1						1	0.4	
Sclerolaena divaricata	Biennial shrub/subshrub			1									0.1	
Sclerolaena longicuspis	Biennial shrub/subshrub			1	1							1	0.4	
Sclerolaena ventricosa	Biennial shrub/subshrub			1									0.1	
Arabidella nasturtium	Ephemeral/annual			1									0.1	
Cullen sp.	Ephemeral/annual		1	1									0.2	
Goodenia calcarata	Ephemeral/annual		1	1									0.2	
Nicotiana simile	Ephemeral/annual			1									0.1	
Senecio glossanthus	Ephemeral/annual			1									0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	2.4	10
Perennials/biennials	1.7	5
Ephemerals	0.7	5

Total Density Long-lived Perennial Shrubs	0
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COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.7
Shrub/subshrub	1.0	Biennial	1.0
Grass	0.7	Ephemeral/annual	0.7
Herb	0.7	All species	2.4
Shrubs & trees	0	All perennials	1.7
Grasses & herbs	1.4		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM13		September 2007									
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density
		1	2	3	4	5	6	7	8	9	10		
Eremophila freelingii	Long-lived perennial shrub						5	10	100	60	100	27.5	2
Ptilotus obovatus	Biennial shrub/subshrub										1	0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	0.6	2
Perennials/biennials	0.6	2
Ephemerals	0	0
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	27.5	Long-lived perennial	27.5
Shrub/subshrub	27.6	Biennial	0.1
Grass	0	Ephemeral/annual	0
Herb	0	All species	27.6
Shrubs & trees	27.5	All perennials	27.6
Grasses & herbs	0		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM14		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Astrebla pectinata	Long-lived perennial grass					1	1				1		0.3	
Neobassia proceriflora	Biennial shrub/subshrub										1		0.1	
Sclerolaena intricata	Biennial shrub/subshrub		5					1	1	1	2		1.0	
Sclerolaena ventricosa	Biennial shrub/subshrub	1		1									0.2	
Rhodanthe floribunda	Ephemeral/annual								1				0.1	
Salsola kali	Ephemeral/annual					1							0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	1.3	6
Perennials/biennials	1.1	4
Ephemerals	0.2	2
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.3
Shrub/subshrub	1.3	Biennial	1.3
Grass	0.3	Ephemeral/annual	0.2
Herb	0.2	All species	1.8
Shrubs & trees	0	All perennials	1.6
Grasses & herbs	0.5		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM15		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Tetragonia sp.	Ephemeral/annual											1	0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	0.1	1
Perennials/biennials	0	0
Ephemerals	0.1	1
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0
Shrub/subshrub	0	Biennial	0
Grass	0	Ephemeral/annual	0.1
Herb	0.1	All species	0.1
Shrubs & trees	0	All perennials	0
Grasses & herbs	0.1		

BEVERLEY URANIUM PHOTOPOINT QUADRAT												FM16		September 2007	
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density		
		1	2	3	4	5	6	7	8	9	10				
Astrebla pectinata	Long-lived perennial grass	1									1	0.2			
Sclerolaena longicuspis	Biennial shrub/subshrub								1	1	1	0.3			
Sclerolaena ventricosa	Biennial shrub/subshrub							1		1		0.2			
Arabidella nasturtium	Ephemeral/annual			1								0.1			
Rhodanthe microglossa	Ephemeral/annual										1	0.1			
Salsola kali	Ephemeral/annual			1								0.1			
Zygophyllum iodocarpum	Ephemeral/annual									1		0.1			
Tripogon loliiformis	Ephemeral/annual grass	1				1						0.2			

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	1.3	8
Perennials/biennials	0.7	3
Ephemerals	0.6	5
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.2
Shrub/subshrub	0.5	Biennial	0.5
Grass	0.4	Ephemeral/annual	0.6
Herb	0.4	All species	1.3
Shrubs & trees	0	All perennials	0.7
Grasses & herbs	0.8		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM17		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Eremophila duttonii	Long-lived perennial shrub		25	5	5	25					2		6.2	2
Sclerolaena divaricata	Biennial shrub/subshrub	1					1			1			0.3	
Sclerolaena longicuspis	Biennial shrub/subshrub									1			0.1	
Sclerolaena ventricosa	Biennial shrub/subshrub			1		1							0.2	
Salsola kali	Ephemeral/annual					1							0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	1.2	5
Perennials/biennials	1.1	4
Ephemerals	0.1	1
Total Density Long-lived Perennial Shrubs		2

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	6.2	Long-lived perennial	6.2
Shrub/subshrub	7.2	Biennial	0.6
Grass	0	Ephemeral/annual	0.1
Herb	0.1	All species	6.9
Shrubs & trees	6.2	All perennials	6.8
Grasses & herbs	0.1		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM18		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Tetragonia sp.	Ephemeral/annual		2							2			0.2	
Tripogon loliiformis	Ephemeral grass											1	0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	0.3	2
Perennials/biennials	0	0
Ephemerals	0.3	2
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0
Shrub/subshrub	0	Biennial	0
Grass	0.1	Ephemeral/annual	0.3
Herb	0.2	All species	0.3
Shrubs & trees	0	All perennials	0
Grasses & herbs	0.3		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM19		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Astrebla pectinata	Long-lived perennial grass										1		0.1	
Sclerolaena brachyptera	Biennial shrub/subshrub			5	1	1	1						0.8	
Sclerolaena divaricata	Biennial shrub/subshrub	1			1			1	1			1	0.5	
Sclerolaena lanicuspis	Biennial shrub/subshrub						1						0.1	
Sclerolaena longicuspis	Biennial shrub/subshrub		1	10									1.1	
Tetragonia sp.	Ephemeral/annual										1		0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	1.4	6
Perennials/biennials	1.3	5
Ephemerals	0.1	1
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.1
Shrub/subshrub	2.5	Biennial	2.5
Grass	0.1	Ephemeral/annual	0.1
Herb	0.1	All species	2.7
Shrubs & trees	0	All perennials	2.6
Grasses & herbs	0.2		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM20		September 2007									
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density
		1	2	3	4	5	6	7	8	9	10		
Eremophila freelingii	Long-lived perennial shrub		2			5	5	25	30	2		6.9	1
Sclerolaena longicuspis	Biennial shrub/subshrub		1		1							0.2	
Bulbine alata	Ephemeral/annual	1										0.1	
Daucus glochidiatus	Ephemeral/annual	1										0.1	
Goodenia calcarata	Ephemeral/annual						1		1			0.2	
Pimelea simplex	Ephemeral/annual	1	1						1		1	0.4	
Rhodanthe microglossa	Ephemeral/annual	1	1		1	1	1	1		1		0.7	
Senecio glossanthus	Ephemeral/annual		1					1	1		1	0.4	
Zygophyllum prismatothecum	Ephemeral/annual	1	1	1		1		1			1	0.6	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	3.3	9
Perennials/biennials	0.8	2
Ephemerals	2.5	7

Total Density Long-lived Perennial Shrubs	1
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COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	6.9	Long-lived perennial	6.9
Shrub/subshrub	7.1	Biennial	0.2
Grass	0	Ephemeral/annual	2.5
Herb	2.5	All species	9.6
Shrubs & trees	6.9	All perennials	7.1
Grasses & herbs	2.5		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM21		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
Astrebla pectinata	Long-lived perennial grass											1	0.1	
Neobassia proceriflora	Biennial shrub/subshrub			1	1	1	1	1					0.5	
Sclerolaena divaricata	Biennial shrub/subshrub					1							0.1	
Sclerolaena ventricosa	Biennial shrub/subshrub		1	1	1	2							0.5	
Arabidella nasturtium	Ephemeral/annual		1										0.1	
Atriplex lindleyi	Ephemeral/annual		1		5	1	2	1					1.0	
Bulbine alata	Ephemeral/annual		1										0.1	
Calotis hispidula	Ephemeral/annual		1										0.1	
Lepidium phlebopetalum	Ephemeral/annual		1										0.1	
Rhodanthe microglossa	Ephemeral/annual		1		1								0.2	
Rhodanthe stricta	Ephemeral/annual				1								0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	2.3	11
Perennials/biennials	1.1	4
Ephemerals	1.2	7
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0.1
Shrub/subshrub	1.1	Biennial	1.1
Grass	0.1	Ephemeral/annual	1.7
Herb	1.7	All species	2.9
Shrubs & trees	0	All perennials	1.2
Grasses & herbs	1.8		

BEVERLEY URANIUM PHOTOPOINT QUADRAT		FM22		September 2007										
Species	Lifespan and Growth Form	% Cover in cells 1-10										Total Cover	Total Density	
		1	2	3	4	5	6	7	8	9	10			
<i>Abutilon halophilum</i>	Biennial shrub/subshrub										5		0.5	
<i>Neobassia proceriflora</i>	Biennial shrub/subshrub										1		0.1	
<i>Sclerolaena brachyptera</i>	Biennial shrub/subshrub		1										0.1	
<i>Sclerolaena divaricata</i>	Biennial shrub/subshrub										1		0.1	
<i>Sclerolaena ventricosa</i>	Biennial shrub/subshrub		2								5		0.7	
<i>Bulbine alata</i>	Ephemeral/annual		1										0.1	
<i>Lepidium phlebopetalum</i>	Ephemeral/annual		1										0.1	
<i>Rhodanthe microglossa</i>	Ephemeral/annual		1										0.1	

SPECIES RICHNESS		
	1 sq m	10 sq m
All species	0.9	8
Perennials/biennials	0.6	5
Ephemerals	0.3	3
Total Density Long-lived Perennial Shrubs		0

COVER (%)	Quadrat total		Quadrat total
Tree/tall shrub	0	Long-lived perennial	0
Shrub/subshrub	1.5	Biennial	1.5
Grass	0	Ephemeral/annual	0.3
Herb	0.3	All species	1.8
Shrubs & trees	0	All perennials	1.5
Grasses & herbs	0.3		

Appendix B: Plant List for the Four Mile Site and Adjacent Areas

Sources: Close and Williams (1979), Fatchen Environmental (2001, 2002), Beverley Uranium Mine annual reports, Badman (2006a, 2007a).

ACANTHACEAE

Rostellularia adscendens var. *pogonanthera* Pink Tongues

AIZOACEAE

Glinus lotoides Hairy Carpet-weed

Gunniopsis quadrifida Sturt's Pigface

Tetragonia eremaea Desert Spinach

Trianthema triquetra Red Spinach

AMARANTHACEAE

Amaranthus grandiflorus Large-flower Amaranth

Ptilotus exaltatus Pink Mulla Mulla

Ptilotus obovatus Silver Mulla Mulla

ASCLEPIADACEAE

Cynanchum floribundum Desert Cynanchum

Marsdenia australis Native Pear

Sarcostemma viminale ssp. *australe* Caustic Bush

BORAGINACEAE

Heliotropium asperrimum Rough Heliotrope

**Heliotropium curassavicum* Smooth Heliotrope

Trichodesma zeylanicum Camel Bush

CAMPANULACEAE

Isotoma petraea Rock Isotome

Wahlenbergia communis Tufted Bluebell

CAPPARACEAE

Capparis mitchellii Native Orange

CARYOPHYLLACEAE

Spergularia marina Salt Sand-spurrey

CASUARINACEAE

Casuarina pauper Black Oak

CHENOPODIACEAE

Atriplex angulata Fan Saltbush

Atriplex holocarpa Pop Saltbush

Atriplex lindleyi ssp. *inflata* Corky Saltbush

Atriplex nummularia Old-man Saltbush

Atriplex spongiosa Pop Saltbush

<i>Atriplex velutinella</i>	Sandhill Saltbush
<i>Atriplex vesicaria</i>	Bladder Saltbush
<i>Chenopodium desertorum</i>	Desert Goosefoot
* <i>Chenopodium murale</i>	Nettle-leaf Goosefoot
<i>Chenopodium pumilio</i>	Clammy Goosefoot
<i>Dissocarpus biflorus</i>	Two-horn Saltbush
<i>Dissocarpus paradoxus</i>	Ball Bindyi
<i>Einadia nutans</i>	Climbing Saltbush
<i>Enchylaena tomentosa</i>	Ruby Saltbush
<i>Eriochiton sclerolaenoides</i>	Woolly-fruit Bluebush
<i>Maireana aphylla</i>	Cotton-bush
<i>Maireana astrotricha</i>	Low Bluebush
<i>Maireana brevifolia</i>	Short-leaf Bluebush
<i>Maireana ciliata</i>	Hairy Fissure-plant
<i>Maireana georgei</i>	Satiny Bluebush
<i>Maireana pyramidata</i>	Black Bluebush
<i>Maireana spongiocarpa</i>	Spongy-fruit Bluebush
<i>Malacocera tricornis</i>	Goat-head Soft-horns
<i>Neobassia proceriflora</i>	Desert Glasswort
<i>Osteocarpum acropterum</i> var. <i>acropterum</i>	Tuberculate Bonefruit
<i>Rhagodia spinescens</i>	Spiny Saltbush
<i>Salsola kali</i>	Buckbush
<i>Sclerolaena bicornis</i>	Goat-head Bindyi
<i>Sclerolaena brachyptera</i>	Short-wing Bindyi
<i>Sclerolaena decurrens</i>	Green Bindyi
<i>Sclerolaena diacantha</i>	Grey Bindyi
<i>Sclerolaena divaricata</i>	Tangled Bindyi
<i>Sclerolaena intricata</i>	Tangled Bindyi
<i>Sclerolaena lanicuspis</i>	Spinach Bindyi
<i>Sclerolaena limbata</i>	Pearl Bindyi
<i>Sclerolaena longicuspis</i>	Long-spine Bindyi
<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi
<i>Sclerolaena patenticuspis</i>	Spear-fruit Bindyi
<i>Sclerolaena ventricosa</i>	Salt Bindyi

COMPOSITAE

<i>Brachyscome ciliaris</i> var. <i>lanuginosa</i>	Woolly Variable Daisy
<i>Brachyscome lineariloba</i>	Hard-head Daisy
<i>Calotis cymbacantha</i>	Showy Burr-daisy
<i>Calotis hispidula</i>	Hairy Burr-daisy
* <i>Centaurea melitensis</i>	Malta Thistle
<i>Chrysocephalum apiculatum</i>	Common Everlasting
<i>Flaveria australasica</i>	Yellow Twin-stem
<i>Glossocardia bidens</i>	Native Cobbler's-pegs
<i>Gnephosis arachnoidea</i>	Spidery Button-flower
<i>Isoetopsis graminifolia</i>	Grass Cushion
* <i>Lactuca serriola</i>	Prickly Lettuce
<i>Leiocarpa leptolepis</i>	Pale Plover-daisy
<i>Leiocarpa websteri</i>	Narrow Plover-daisy
<i>Minuria cunninghamii</i>	Bush Minuria

<i>Minuria denticulata</i>	Woolly Minuria
<i>Minuria leptophylla</i>	Minnie Daisy
<i>Pluchea rubelliflora</i>	
<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed
<i>Pterocaulon sphacelatum</i>	Apple-bush
<i>Rhodanthe floribunda</i>	White Everlasting
<i>Rhodanthe microglossa</i>	Clustered Everlasting
<i>Rhodanthe moschata</i>	Musk Daisy
<i>Rhodanthe pygmaea</i>	Pigmy Daisy
<i>Rhodanthe stricta</i>	Slender Everlasting
<i>Rhodanthe uniflora</i>	Woolly Daisy
<i>Senecio gregorii</i>	Fleshy Groundsel
<i>Senecio lanibracteus</i>	Inland Shrubby Groundsel
<i>Senecio magnificus</i>	Showy Groundsel
<i>Senecio odoratus</i>	Scented Groundsel
<i>Senecio quadridentatus</i>	Cotton Groundsel
* <i>Sonchus oleraceus</i>	Common Sow-thistle
<i>Streptoglossa adscendens</i>	Desert Daisy
<i>Vittadinia eremaea</i>	Desert New Holland Daisy

CONVOLVULACEAE

<i>Convolvulus erubescens</i> complex	
<i>Convolvulus remotus</i>	Grassy Bindweed

CRUCIFERAE

<i>Arabidella nasturtium</i>	Yellow Cress
<i>Arabidella trisecta</i>	Shrubby Cress
<i>Lepidium oxytrichum</i>	Green Peppergrass
<i>Lepidium phlebopetalum</i>	Veined Peppergrass
<i>Menkea australis</i>	Fairy Spectacles
* <i>Sisymbrium erysimoides</i>	Smooth Mustard

CUCURBITACEAE

* <i>Citrullus colocynthis</i>	Colocynth
* <i>Cucumis myriocarpus</i>	Paddy Melon
<i>Mukia maderaspatana</i>	Snake Vine

CYPERACEAE

<i>Cyperus gymnocaulos</i>	Spiny Flat-sedge
<i>Cyperus</i> sp.	Flat-sedge
<i>Schoenoplectus litoralis</i>	Shore Club-rush

EUPHORBIACEAE

<i>Chamaesyce australis</i>	
<i>Chamaesyce drummondii</i>	
<i>Euphorbia stevenii</i>	Bottletree Spurge
<i>Euphorbia tannensis</i> ssp. <i>eremophila</i>	Desert Spurge
* <i>Ricinus communis</i>	Castor Oil Plant

FRANKENIACEAE

<i>Frankenia serpyllifolia</i>	Thyme Sea-heath
GENTIANACEAE	
* <i>Centaurium erythraea</i>	Common Centaury
GERANIACEAE	
<i>Erodium carolinianum</i>	Clammy Heron's-bill
<i>Erodium cygnorum</i>	Blue Heron's-bill
GOODENIACEAE	
<i>Goodenia calcarata</i>	Streaked Goodenia
<i>Goodenia lunata</i>	Stiff Goodenia
<i>Goodenia</i> sp.	Goodenia
<i>Scaevola spinescens</i>	Spiny Fanflower
GRAMINEAE	
<i>Aristida contorta</i>	Curly Wire-grass
<i>Aristida latifolia</i>	Feather-top Wire-grass
<i>Aristida nitidula</i>	Brush Three-awn
<i>Astrebla lappacea</i>	Curly Mitchell-grass
<i>Astrebla pectinata</i>	Barley Mitchell-grass
<i>Austrostipa</i> sp.	Spear-grass
* <i>Cenchrus ciliaris</i>	Buffel Grass
<i>Chloris pectinata</i>	Comb Windmill Grass
<i>Cymbopogon ambiguus</i>	Lemon-grass
* <i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch
<i>Dactyloctenium radulans</i>	Button-grass
<i>Dichanthium sericeum</i>	Silky Blue-grass
<i>Digitaria ammophila</i>	Spider Grass
<i>Digitaria brownii</i>	Cotton Panic-grass
<i>Enneapogon avenaceus</i>	Common Bottle-washers
<i>Enneapogon caerulescens</i> var. <i>caerulescens</i>	Blue Bottle-washers
<i>Enneapogon polyphyllus</i>	Leafy Bottle-washers
<i>Eragrostis australasica</i>	Cane-grass
<i>Eragrostis dielsii</i> var. <i>dielsii</i>	Mulka
<i>Eragrostis eriopoda</i>	Woollybutt
<i>Eragrostis setifolia</i>	Bristly Love-grass
<i>Eragrostis xerophila</i>	Knotty-butt Neverfail
<i>Eulalia aurea</i>	Silky Brown-top
<i>Leptochloa digitata</i>	Umbrella Cane-grass
<i>Panicum decompositum</i> var. <i>decompositum</i>	Native Millet
* <i>Polypogon monspeliensis</i>	Annual Beard-grass
* <i>Schismus barbatus</i>	Arabian Grass
<i>Setaria constricta</i>	Knotty-butt Paspalidium
<i>Sporobolus actinocladius</i>	Ray Grass
<i>Themeda triandra</i>	Kangaroo Grass
<i>Tragus australianus</i>	Small Burr-grass
<i>Triodia irritans</i>	Spinifex
<i>Tripogon loliiformis</i>	Five-minute Grass
<i>Triraphis mollis</i>	Purple Plume Grass

HALORAGACEAE

Haloragis aspera Rough Raspwort

LABIATAE

**Mentha spicata* Spearmint

Teucrium racemosum Grey Germander

LEGUMINOSAE

Acacia aneura

Acacia ligulata Umbrella Bush

Acacia oswaldii Umbrella Wattle

Acacia tetragonophylla Dead Finish

Acacia victoriae Elegant Wattle

Crotalaria eremaea ssp. *eremaea* Downy Loose-flowered Rattle-pod

Cullen australasicum Tall Scurf-pea

Cullen patens Spreading Scurf-pea

Goodia medicaginea Western Golden-tip

Isotropis wheeleri Wheeler's Lamb-poison

Lotus cruentus Red-flower Lotus

Senna artemisioides ssp. *coriacea* Broad-leaf Desert Senna

Senna artemisioides ssp. *helmsii* Blunt-leaf Senna

Senna artemisioides ssp. *oligophylla* Limestone Senna

Senna artemisioides ssp. *petiolaris*

Senna artemisioides ssp. *zygophylla* Twin-leaf Desert Senna

Swainsona oligophylla

Swainsona sp. Swainson-pea

Swainsona swainsonioides Downy Swainson-pea

Templetonia egena Broombush Templetonia

Trigonella suavissima Sweet Fenugreek

LILIACEAE

Bulbine alata Winged Bulbine-lily

LORANTHACEAE

Amyema preissii Wire-leaf Mistletoe

Lysiana exocarpi ssp. *exocarpi* Harlequin Mistletoe

MALVACEAE

Abutilon halophilum Plains Lantern-bush

Abutilon leucopetalum Desert Lantern-bush

Gossypium sturtianum var. *sturtianum* Sturt's Desert Rose

Hibiscus krichauffianus Velvet-leaf Hibiscus

Malva behriana Australian Hollyhock

**Malva parviflora* Small-flower Marshmallow

**Malva* sp. Mallow

Malvastrum americanum var. *americanum* Malvastrum

Sida ammophila Sand Sida

Sida corrugata Corrugated Sida

Sida fibulifera Pin Sida

<i>Sida intricata</i>	Twiggy Sida
<i>Sida phaeotricha</i>	Hill Sida
<i>Sida trichopoda</i>	High Sida
MYOPORACEAE	
<i>Eremophila duttonii</i>	Harlequin Emubush
<i>Eremophila freelingii</i>	Rock Emubush
<i>Eremophila latrobei</i>	Crimson Emubush
<i>Eremophila longifolia</i>	Weeping Emubush
<i>Eremophila sturtii</i>	Turpentine Bush
<i>Myoporum montanum</i>	Native Myrtle
MYRTACEAE	
<i>Eucalyptus camaldulensis</i> var. <i>obtusa</i>	Northern River Red Gum
<i>Eucalyptus gillii</i>	Curly Mallee
<i>Eucalyptus intertexta</i>	Gum-barked Coolibah
<i>Melaleuca dissitiflora</i>	
<i>Melaleuca glomerata</i>	Inland Paper-bark
NYCTAGINACEAE	
<i>Boerhavia dominii</i>	Tar-vine
<i>Commicarpus australis</i>	Pink Gum-fruit
PITTOSPORACEAE	
<i>Pittosporum angustifolium</i>	Native Apricot
PLANTAGINACEAE	
<i>Plantago drummondii</i>	Dark Plantain
POLYGONACEAE	
* <i>Acetosa vesicaria</i>	Rosy Dock
<i>Muehlenbeckia florulenta</i>	Lignum
PORTULACACEAE	
<i>Portulaca oleracea</i>	Common Purslane
PRIMULACEAE	
* <i>Anagallis arvensis</i>	Pimpernel
PROTEACEAE	
<i>Hakea ednieana</i>	Flinders Ranges Corkwood
<i>Hakea leucoptera</i> ssp. <i>leucoptera</i>	Silver Needlewood
SANTALACEAE	
<i>Santalum lanceolatum</i>	Plumbush
SAPINDACEAE	
<i>Alectryon oleifolius</i> ssp. <i>canescens</i>	Bullock Bush
<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	Narrow-leaf Hop-bush

SOLANACEAE

<i>*Nicotiana glauca</i>	Tree Tobacco
<i>Nicotiana velutina</i>	Velvet Tobacco
<i>Solanum chenopodium</i>	Goosefoot Potato-bush
<i>Solanum coactiliferum</i>	Tomato-bush
<i>Solanum ellipticum</i>	Velvet Potato-bush
<i>*Solanum nigrum</i>	Black Nightshade
<i>Solanum quadriculatum</i>	Plains Nightshade

THYMELAEACEAE

<i>Pimelea microcephala</i>	Shrubby Riceflower
<i>Pimelea simplex</i> ssp. <i>continua</i>	Desert Riceflower
<i>Pimelea trichostachya</i>	Spiked Riceflower

TYPHACEAE

<i>Typha domingensis</i>	Narrow-leaf Bulrush
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UMBELLIFERAE

<i>Daucus glochidiatus</i>	Native Carrot
<i>Trachymene glaucifolia</i>	Blue Parsnip

ZYGOPHYLLACEAE

<i>*Tribulus terrestris</i>	Caltrop
<i>Zygophyllum ammophilum</i>	Sand Twinleaf
<i>Zygophyllum apiculatum</i>	Pointed Twinleaf
<i>Zygophyllum prismatothecum</i>	Square-fruit Twinleaf
<i>Zygophyllum</i> sp.	Twinleaf