



A Vegetation and Flora Survey of Beasley River



Prepared for Rio Tinto Iron Ore

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1.0 Background to the Study

1.1 Scope and Objectives of the Study

Rio Tinto Iron Ore (RTIO) is conducting a series of baseline biological surveys at potential future development sites to provide early identification of environmental constraints and potential approvals issues. As part of this initiative, Biota Environmental Sciences (Biota) was commissioned in May 2009 to conduct a biological survey in the Beasley River study area (Figure 1.1). This report has been prepared to summarise the results of the vegetation and flora survey component of the study.

The botanical field survey was planned and implemented as far as practicable according to the Environmental Protection Authority (EPA) Position Statement No. 3 "*Terrestrial Biological Surveys as an Element of Biodiversity Protection*" (EPA 2002) and Guidance Statement No. 51 "*Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*" (EPA 2004).

The primary objectives of the botanical survey were to:

- describe and map the vegetation types occurring within the study area (see Appendix 1);
- identify any vegetation types of conservation significance within the study area (see Section 3.2);
- generate an indicative list of flora species for the study area (see Appendix 2);
- identify any flora of conservation significance (including Declared Rare Flora (DRF), Priority Flora and other flora of interest; see Section 4.1); and
- address the Ten Clearing Principles required for Native Vegetation Clearing Permits (NVCPs) under Schedule 5 of the *Environmental Protection Amendment Act 2003*.

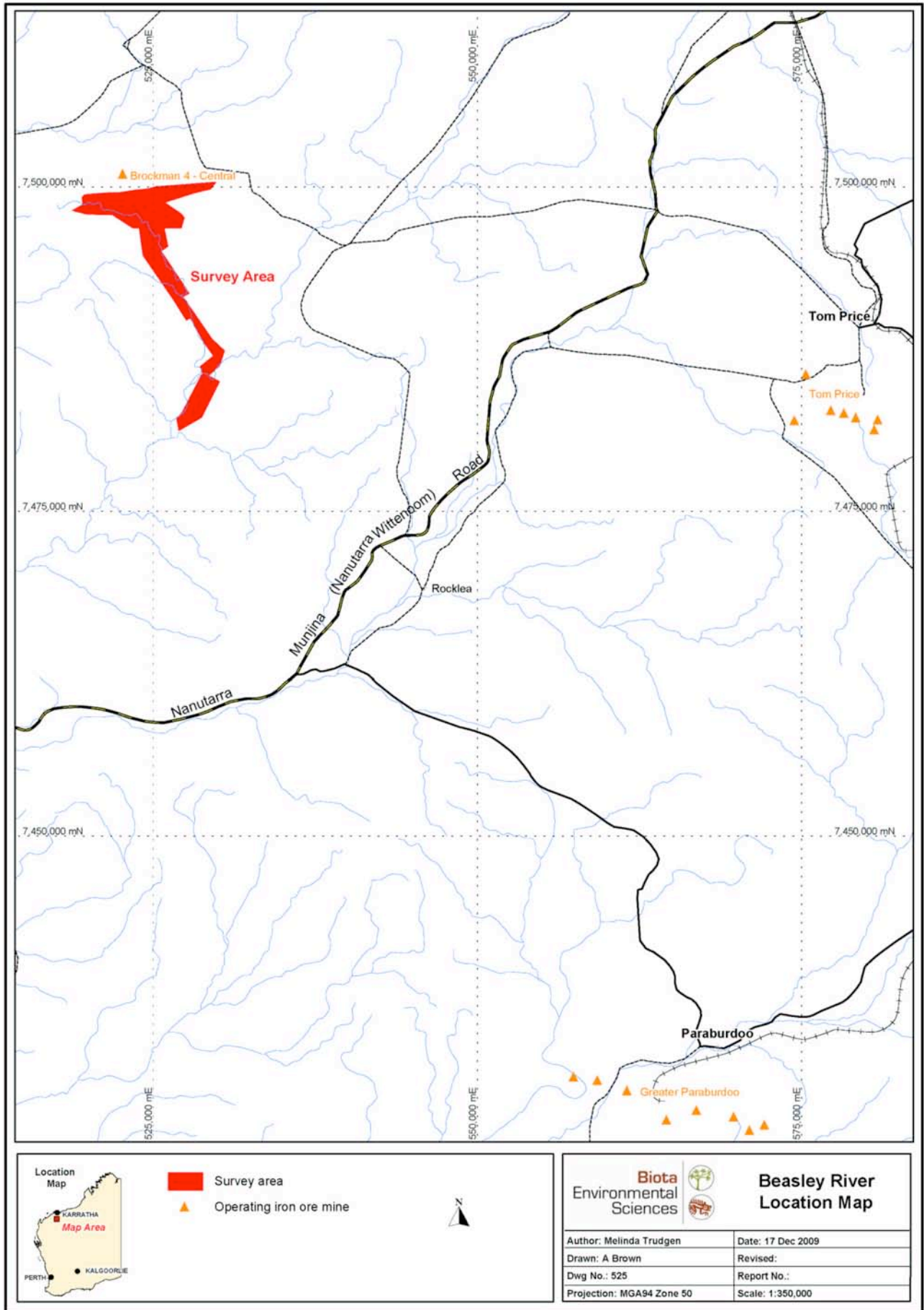


Figure 1.1: Location of the Beasley River study area.

2.0 Methodology

2.1 Survey Methods

The majority of the Beasley River study area (i.e. the section north of the Beasley River) was surveyed in May 2009, and the remainder (south of the Beasley River) was surveyed in September 2009. A total of 56 person days was spent in the field by various botanists from Biota, as follows:

- 19/05/2009-28/05/2009: Michi Maier, Melinda Trudgen, Paul Hoffman, Justin Fairhead and Prue Anderson (Michi Maier attended until 21/05/2009); and
- 07/09/2009-11/09/2009: Melinda Trudgen, Justin Fairhead and Prue Anderson (Prue Anderson attended until 09/09/2009).

During the course of the study, 35 standard¹ 50m x 50m detailed floristic survey quadrats were established in representative habitats and vegetation types through the study area (see mapping in Appendix 1 and raw data in Appendix 3). These were supplemented by extensive foot traverses to search for additional flora and provide notes for mapping. These two approaches were combined to create an indicative species list for the study area.

The vegetation descriptions, and subsequent mapping, were based on the height and estimated cover of dominant species using Aplin's (1979) modification of the vegetation classification of Specht (1970) to include a hummock grassland category (see Appendix 4). Descriptions were made at each of the floristic survey quadrats, and during foot traverses through the study area.

Voucher specimens were collected in the field of all taxa other than common species. The majority of specimen identifications were completed by botanists from Biota, with assistance sought from external specialists as necessary. The following external organisations and persons are gratefully acknowledged for their assistance with this study:

- Ms Anna Rowe and Mr Nev Havelberg (RTIO), for providing records of Priority Flora species recorded from the Beasley River locality by Mr Emil Thoma (botanist with RTIO); and
- Mr Malcolm Trudgen (ME Trudgen and Associates), for providing assistance with specimen identifications.

2.2 Desktop Review

A search of the Department of Environment and Conservation (DEC) Threatened Flora Database and the Western Australian Herbarium Specimen Database was conducted (DEC 2009a, 2009b). Existing flora and vegetation reports from the local area were also reviewed (Biota 2005, 2007a, 2007b, 2007c). The information from these sources was used for comparison with data collected during the field survey.

2.3 Limitations of the Study

A number of limitations of the field survey and subsequent conservation assessments are discussed below. These are factors that must be considered when reviewing and applying the results of this study. Despite these limitations, the field study and the subsequent analyses are considered to give an adequate representation of the vegetation and flora values of the study area currently under review.

¹ For the Pilbara bioregion.

The main limitations of this study are as follows:

- Fungi and nonvascular flora (eg. algae, mosses and liverworts) were not specifically sampled, as is typical for surveys of this nature.
- While conditions were adequate for the collection of ephemeral flora and cryptic perennial species, the entire survey area was not systematically searched. The species list should therefore be taken as indicative rather than exhaustive. It is probable that species of conservation significance (and also the introduced weeds) are more widespread in the area, and other species may be present.
- No floristic analysis has been conducted as yet using the data from the quadrats established for this study.
- A 319 ha section of the study area (in the northeast) was inaccessible and was not surveyed (see Appendix 1).

3.0 Vegetation

3.1 Vegetation Condition

The vegetation in the Beasley River study area is predominantly in a Very Good to Excellent condition (see Appendix 4 for the condition scale). Weed infestation is the most common degrading influence within the area, along with limited impacts from tracks, an old exploration drilling program and direct impacts of cattle grazing. Weed infestation is predominantly restricted to within the drainage systems, with some areas in Very Poor condition due to extensive infestation by *Cenchrus ciliaris* (Buffel Grass).

3.2 Vegetation Types of Conservation Significance

Vegetation mapping for the study area has been completed and does not indicate any vegetation types that qualify for specific legislative protection (i.e. Threatened Ecological Communities (TECs) (DEC 2006)). Similarly, no Priority Ecological Communities (PECs) were identified during the current survey.

It is recommended that the vegetation types listed below as having a High conservation status be resurveyed and possibly excluded from the project area, on account of their unusual species assemblages and/or probable scarcity within the Hamersley subregion of the Pilbara bioregion (see Environment Australia 2000). Management recommendations and a more detailed examination of the conservation status of each unit, if required, can be provided following statistical analysis of the data (see Section 3.3)

3.2.1 Vegetation Types of High Conservation Significance

3.2.1.1 Snakewood (*Acacia xiphophylla*) on cracking clay

- **AxDIPa** *Acacia xiphophylla* tall open shrubland over *Dipteracanthus australasicus* subsp. *australasicus* scattered low shrubs

This vegetation type occurred on cracking clay on top of a mesa (Plate 3.1). It is particularly noteworthy because of its position high in the landscape, as it is unusual to see areas of cracking clay on top of hills in this part of the Pilbara. The vegetation was in Very Good condition, and the only recorded weed was *Portulaca oleracea*. Associated species included *Capparis lasiantha*, *Cassia luerssenii*, *Dichanthium sericeum* subsp. *humilius*, *Hibiscus brachysiphonius*, *Triodia epactia*, *T. wiseana* and *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (Priority 3, see Section 4.1). Quadrat BRL19.

3.2.1.2 Snakewood (*Acacia xiphophylla*) on sandy plains

- **AxTaTlo** *Acacia xiphophylla* scattered tall shrubs to shrubland over *Triodia angusta*, *T. longiceps* very open hummock grassland

This vegetation type was restricted to sandy colluvial plains adjacent to hills, south of the Beasley River (Plate 3.2). It was associated with significant populations of the Priority 1 species *Ptilotus trichocephalus* (see Section 4.1). The vegetation condition was Very Good to Excellent, with some tracks passing through and no weed species recorded. It is a fairly broadly defined vegetation type, with large areas of open *Triodia angusta* and/or *T. longiceps* hummock grassland and pockets of Snakewood (*Acacia xiphophylla*). The vegetation was crossed by occasional minor flowlines, predominantly with a low shrubland of *Melaleuca eleuterostachya*, *Cassia* species and *Scaevola spinescens*. Other associated species included *Acacia synchronicia*, *Eremophila cuneifolia*, *Maireana eriosphaera*, *Maireana tomentosa* and *Sclerolaena densiflora*. Quadrat BRL34.



Plate 3.1: Vegetation type AxDIPa.



Plate 3.2: Vegetation type AxTaTlo.

3.2.2 Vegetation Types of Moderate Conservation Significance

3.2.2.1 Mulga (*Acacia aneura*) slopes

- **AanEItE** *Acacia aneura*, *Eucalyptus leucophloia* subsp. *leucophloia* low open forest over *Triodia epactia* hummock grassland

This vegetation type occurred on mesa and other hill slopes throughout most of the study area. Lower slope Mulga (*Acacia aneura*) is listed by DEC as an 'ecosystem at risk' (Kendrick 2001), however it does not appear to be unusual within the Beasley River study area. The vegetation was in Very Good to Excellent condition. Associated species included *Acacia pruinocarpa*, *Cassia glutinosa*, *Ptilotus rotundifolius*, *P. schwartzii* var. *schwartzii* and *Solanum lasiophyllum*. No sites from this study.

3.2.2.2 Snakewood (*Acacia xiphophylla*) on cracking clay

- **AxAanTw** *Acacia xiphophylla* (Snakewood), *A. aneura* tall shrubland over *Triodia wiseana* open hummock grassland

This vegetation type occurred on cracking clay on a mesiform hill, just north of the Beasley River. It was restricted to a single small area within the study area, and the combination of substrate and habitat is an unusual feature for the locality. The vegetation was in a Good condition, with the weed Spiked Malvastrum (**Malvastrum americanum*) and an old vehicle track present. No sites from this study.

- **AxSCsCAo** *Acacia xiphophylla* tall open shrubland over *Scaevola spinescens*, *Cassia oligophylla* scattered low shrubs

This vegetation type occurred on an area of cracking clay on the edge of a hill, south of the Beasley River. It was restricted to a single small area within the Beasley River study area, and represents a locally unusual combination of substrate and habitat. The vegetation was in a Very Good condition, with the weed Spiked Malvastrum (**Malvastrum americanum*) present. Associated species included *Cassia luerssenii*, *Enchylaena tomentosa* var. *tomentosa*, *Eremophila cuneifolia* and *Triodia wiseana*. Quadrat BRL32.



Plate 3.3: Vegetation type AxSCsCAo.

3.2.2.3 Major Creekline Vegetation

- **AcITHtCEc** *Acacia citrinoviridis* tall shrubland over *Themeda triandra*, **Cenchrus ciliaris* tussock grassland

This vegetation type occurred in the upper reaches of a major creekline in the northern section of the study area. The vegetation condition was Poor to Very Poor, due to extensive Buffel Grass (**Cenchrus ciliaris*) infestation. Associated species included *Eucalyptus xerothermica*, *Petalostylis labicheoides* and *Rulingia luteiflora*. No sites from this study.

- **EvExAciCEc** *Eucalyptus victrix*, *E. xerothermica* open woodland over *Acacia citrinoviridis* tall closed scrub over **Cenchrus ciliaris* closed tussock grassland

This vegetation type occurred over several areas in the upper reaches of a major creek. The vegetation condition was Good to Very Poor due to patches of severe Buffel Grass (**Cenchrus ciliaris*) infestation. Associated species included *Acacia pyrifolia* var. *morrisonii*, *A. synchronicia*, *Digitaria brownii*, *Gossypium australe* (Burrup Peninsula form), *G. robinsonii*, *Stylobasium spathulatum*, *Triodia angusta* and *Waltheria indica*. Quadrat BRL02.

- **EcEvAciAcMgCEc** *Eucalyptus camaldulensis*, *E. victrix* open woodland over *Acacia citrinoviridis*, *A. coriacea* subsp. *pendens*, *Melaleuca glomerata* tall shrubland over **Cenchrus ciliaris* very open tussock grassland

This vegetation type occurred in the Beasley River and the other major creekline in the study area (Plate 3.4). The vegetation condition was predominantly Poor, due to Buffel Grass (**Cenchrus ciliaris*) infestation and large populations of Mexican Poppy (**Argemone ochroleuca* subsp. *ochroleuca*) forming patches of seasonal herbland. Associated species included *Capparis spinosa* var. *nummularia*, *Gossypium robinsonii*, *Leptochloa digitata*, *Melaleuca bracteata*, *Pluchea rubeliflora*, *Schoenoplectus litoralis*, *Petalostylis labicheoides*, *Sorghum plumosum* and *Vigna lanceolata*. Quadrats BRL20, BRL27.

- **EvEcMgCYPv** *Eucalyptus victrix*, *E. camaldulensis* open forest over *Melaleuca glomerata* tall shrubland over *Cyperus vaginatus* sedgeland

This vegetation type occurred in the Beasley River in the southern section of the study area. The vegetation condition was rated as Good, due to the degrading influence of some Buffel Grass (**Cenchrus ciliaris*) and other weeds. Associated species included *Acacia citrinoviridis*, *A. tetragonophylla*, *Sesbania cannabina*, *Stylobasium spathulatum* and *Vigna lanceolata*. No sites from this study.

- **ExApyGOsPITeCEc** *Eucalyptus xerothermica* low open woodland over *Acacia pyrifolia*, *Gossypium sturtianum* var. *sturtianum*, *Petalostylis labicheoides* tall shrubland over *Triodia epactia* hummock grassland and **Cenchrus ciliaris* closed tussock grassland

This vegetation type occurred in the upper reaches of a major creekline at the northern end of the study area (Plate 3.5). The vegetation condition was Poor to Very Poor, due to severe Buffel Grass (**Cenchrus ciliaris*) infestation. Associated species included *Acacia bivenosa*, *A. citrinoviridis*, *Gossypium robinsonii*, *Petalostylis labicheoides* and *Rulingia luteiflora*. Quadrat BRL15.



Plate 3.4: Vegetation Type EcEvAciAcMgCEc.



Plate 3.5: Vegetation type ExApyGOsPITe.

3.3 Vegetation of the Beasley River Study Area in a Regional Context

The Beasley River study area includes a series of mesas, which are associated with the Robe Land System (see van Vreeswyk et al. 2004) and are geologically dominated by Robe Pisolite. This geology, and therefore the associated vegetation, has been a target of mining across the Pilbara. Several currently undescribed species are thought to be associated with Robe Pisolite in other areas of the Pilbara, and the rate of loss of Robe Pisolite associated vegetation in the Pilbara is becoming a cause for concern (M.E. Trudgen, M.E. Trudgen & Associates, pers. comm. 2009). To provide a more robust assessment of the conservation significance of vegetation types within the Beasley River study area, statistical analysis of the data collected during this study is required. The analysis should include as many sites on Robe Pisolite from across the Pilbara as possible.

4.0 Flora

4.1 Flora of Conservation Significance

4.1.1 Flora of Conservation Significance Recorded in the Study Area

Four Priority Flora species were recorded from the Beasley River study area during the field survey in 2009 and earlier survey work completed by RTIO. Each species is discussed individually below, while the recorded locations are provided in Appendix 5 and shown on the vegetation mapping in Appendix 1.

Table 4.1: Number of records of Priority Flora within the Beasley River study area.

Species	Priority Level	Number of Records from the Beasley River Study Area
<i>Ptilotus trichocephalus</i>	Priority 1	41
<i>Indigofera</i> sp. Bungaroo Creek (S. van Leeuwen 4301)	Priority 3	5
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	Priority 3	1
<i>Ptilotus subspinescens</i>	Priority 3	66

• *Ptilotus trichocephalus*

Priority 1

This species is a small herb, to a maximum height of 8 cm, with small leaves and conspicuous flowers (in season) (see Plate 4.1). Due to its lifecycle and relatively inconspicuous leaves, this species would be virtually impossible to locate outside of the flowering season (August-September). The second field trip (which surveyed the area south of the Beasley River) was conducted at an opportune time to locate this species, as it was in early fruit and the remaining flowers allowed the species to be identified with ease.

This species was originally located in the Beasley River study area in 2008 by Emil Thoma (botanist with RTIO), and additional locations were recorded during the current survey. These records were all south of the Beasley River, on plains to both the east and west of the range of hills. Extensive searching was undertaken in areas of suitable habitat, and 41 locations were recorded, representing three distinct populations and two outlying records. The population to the west of the range of hills comprised approximately 60 individuals. On the east of the range, the southern population had approximately 130 individuals. Also on the east of the range, the northern population had approximately 290 individuals within the study area (note that although these occur within two separate vegetation types on the map, they represent a continuous population). A further approximately 115 individuals were recorded outside the study area. The boundary of this population outside the study area was not recorded and the total size of this northeastern population would be greater than the approximately 405 individuals reported here. These records represent a small range extension (approximately 20 km west-northwest) from the 13 populations previously recorded for the locality.

The main populations of *P. trichocephalus* within the study area were associated with the vegetation type AxTaTlo, occurring on plains with a calcareous sandy substrate, particularly where there was a continuous surface layer of manganese (?) pebbles (see Plate 4.1, Section 3.2).

Five locations in other potentially suitable habitat along roads surrounding the Beasley River study area were searched in an attempt to locate other populations, resulting in a single individual of *P. trichocephalus* being found at the location of a previously recorded population.



Plate 4.1: Habitat and close-up of *Pilotus trichocephalus*.

• ***Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301)**

Priority 3

This species is a tall shrub to approximately 1.8 m high, with somewhat scabrid leaves (sandpapery when rubbed) and pink to purple flowers (Plate 4.2). It is usually found in creeks or minor flowlines, and is known from the Brockman area as well as the Bungaroo Valley. Two specimens from the Silvergrass area (approximately 35 km north of the Beasley River study area) are the closest record of this species in the WA Herbarium database (none are recorded within a radius of 50 km on the Department of Environment and Conservation Threatened Flora Database). However, it should be noted that this species has only recently been recognised as distinct from the common taxon *Indigofera monophylla*, and it is likely that it occurs more frequently in the locality than current records indicate. *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301) was recorded at five locations within the Beasley River study area, all in small drainage lines along the western side of the area.

• ***Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479)**

Priority 3

This small spreading herb, to 10cm high, was recorded at one location by Emil Thoma of RTIO (see Appendix 4), in an area of Snakewood (*Acacia xiphophylla*) shrubland on cracking clay (Plate 4.3). The species was not relocated during fieldwork for the current study, despite the placement of a quadrat in the same vegetation type, within 30 m of the original location. The first field survey for the current study, which included the recorded locality for this species, was conducted at a time when this species would probably have been flowering or fruiting, and therefore relatively easy to find. It is possible that the initial record was misidentified, and that it was the similar looking *Oldenlandia crouchiana*, however the habitat preferences suggest this is not the case (*Oldenlandia* sp. Hamersley Station is restricted to cracking clays, while *Oldenlandia crouchiana* is more typically found on stony plains and in rocky areas). Suitable habitat for this species appears to be limited to four small areas (comprising vegetation types AxDIPa, AxAanTw and AxSCsCAo), therefore the species is unlikely to occur widely in the study area.



Plate 4.2: *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301).



Plate 4.3: Habitat of *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479).

- ***Ptilotus subspinescens***

Priority 3

This is a compact shrub to 80 cm high (Davis 2007). It was previously known from 48 locations within the Beasley River study area, and an additional 18 locations were recorded during this study (see Appendix 4). This species occurs on calcrete soils on the lower slopes of mesas and extends onto calcrete areas on adjacent plains. It was relatively common in this habitat in the northern part of the study area, but was not found to occur in similar calcrete habitat in the southern part of the study area.



Plate 4.4: Habitat and close-up of *Ptilotus subspinescens* (representative photos taken at West Turner Syncline).

4.1.2 Probability of Other Species of Interest Occurring in the Study Area

4.1.2.1 Declared Rare Flora

There are currently only two DRF in the Pilbara; Mountain Thryptomene (*Thryptomene wittweri*) and Hamersley Lepidium (*Lepidium catapycnon*). Both of these species are also listed as Threatened Flora Species under the EPBC Act 1999. There is no suitable habitat (high-altitude mountain-tops) for *Thryptomene wittweri* in the Beasley River study area. *Lepidium catapycnon* is known from near Tom Price, approximately 45 km east, however this species has not been recorded from the Brockman locality to date despite intensive searches. Neither species is expected to occur within the Beasley River study area.

4.1.2.2 Priority Flora

Systematic searches for rare flora were not possible within the scope of this project. It is probable that the Priority Flora species recorded are more widespread than the records from the current surveys indicate. It is also possible that additional Priority Flora species are present; in particular, *Eremophila magnifica* subsp. *magnifica* and *Eremophila magnifica* subsp. *velutina* have been recorded from the Brockman Syncline 4 area directly to the north (Biota 2005, DEC 2009a), and could be present on hills within the Beasley River area.

4.2 Introduced Flora (Weeds)

Eleven species of introduced flora were recorded within the Beasley River study area (Table 4.2). Two of these species (**Argemone ochroleuca* subsp. *ochroleuca* and **Datura leichhardtii*) are Declared Plants listed under the Agriculture and Related Resources Protection Act 1976, however both are excluded from the list for the Shire of Ashburton where the Beasley River study area is located. Although not Declared Plants, the **Cenchrus* species, **Aerva javanica* and **Vachellia farnesiana* are considered to be serious environmental weeds (Department of Conservation and Land Management (CALM) 1999). **Cenchrus ciliaris* and **C. setiger* were common on creekbanks in the study area, sometimes forming dense infestations. **Aerva javanica* was recorded at a single location, near the main access road in the western section of the study area. **Vachellia farnesiana* was most commonly recorded within creeklines and

drainage systems, with occasional records on plains. The recorded locations of weeds within the Beasley River study area are provided in Appendix 4 and shown in the vegetation mapping in Appendix 1.

Table 4.2: Weed rating (CALM 1999) and number of records of Introduced flora within the Beasley River study area. Note that many individuals may be present at any given record (population estimates are presented in Appendix 4).

Species	Common Name	Weed Rating	Number of Records
* <i>Aerva javanica</i>	Kapok Bush	High	1
* <i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	Mexican Poppy	Mild	4
* <i>Bidens bipinnata</i>	Beggars Ticks	(not rated); would probably be Low	3
* <i>Cenchrus ciliaris</i>	Buffel Grass	High	25
* <i>Cenchrus setiger</i>	Birdwood Grass	High	2
* <i>Datura leichhardtii</i>	Native Thornapple	Moderate	1
* <i>Malvastrum americanum</i>	Spiked Malvastrum	Moderate	12
* <i>Melochia pyramidata</i>	Pyramid Flower	Mild	1
* <i>Portulaca oleracea</i>	Purslane	(not rated); would be Low	1
* <i>Setaria verticillata</i>	Whorled Pigeon Grass	Low	3
* <i>Vachellia farnesiana</i>	Mimosa Bush	High	7

5.0 Addressing the Ten Principles for Clearing of Native Vegetation

To facilitate any future application for a Native Vegetation Clearing Permit, the 10 principles against which applications are assessed are addressed herein. As the project development areas have yet to be clearly defined, this is intended as a broad assessment for the study area as a whole, and further work (for example, systematic rare flora searches) may still be required for particular areas.

1. Native vegetation should not be cleared if it comprises a high level of biological diversity.

A total of 311 species of native vascular flora, from 46 families, were recorded in the Beasley River study area (see Appendix 2). This represents a moderate level of species diversity, being neither atypically high or low given the size and location of the study area and the range of habitats encompassed.

2. Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

For discussion of fauna in the Beasley River study area, please see Biota (2009a).

3. Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

A systematic search of the entire study area for rare flora was not part of the scope of this survey. Point locations for all rare flora that were recorded during the survey are provided in Appendix 4.

Ptilotus trichocephalus (Priority 1) was recorded predominantly in areas of vegetation type AxTaTlo towards the southern end of the survey area. These populations should not be disturbed and, if possible, vegetation type AxTaTlo should be avoided. Note that as this species is highly inconspicuous when not flowering, any further survey work for this species should be undertaken during the peak flowering season (late August-September).

Oldenlandia sp. Hamersley Station (A.A. Mitchell PRP 1479) (Priority 3) was recorded in vegetation type AxDIPa, which occurs in two stands, and vegetation types AxAanTw and AxSCsCAo may also provide suitable habitat. These vegetation types are unusual (see comments in Section 3.2) and should be excluded from clearing if possible.

Indigofera sp. Bungaroo Creek (S. van Leeuwen 4301) (Priority 3) was recorded in minor flowlines along the western edge of the survey area, and these flowlines should be systematically searched prior to clearing to more fully document the extent of these populations.

Ptilotus subspinescens (Priority 3) was found in the northern section of the study area, occurring in a variety of vegetation types on plains at the base of mesas. This species is locally abundant on this habitat type and limited clearing (i.e. track development) should not pose a threat to the conservation status of this species.

4. Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

No TECs or PECs of a botanical nature were identified in the Beasley River study area during the current survey work. For discussion of potential stygobitic TECs, see Biota (2009b).

5. Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Native vegetation in the area is largely intact, or has been only minimally cleared for tracks and roads. The Brockman Syncline 4 area, which has been subject to an intensive drilling programme and is now under construction as a mine, lies directly to the north of

the Beasley River study area, however this area predominantly covers a different suite of habitats.

6. *Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.*

No permanent wetlands were identified in the Beasley River study area during the current survey work (see Appendix 1 for a list of vegetation types associated with drainage areas). However, the Beasley River study area includes the Beasley River itself and another large watercourse, both of which are typical of large ephemeral creek systems in this part of the Pilbara. Although limited clearing should not pose a threat to species or species assemblages in these habitats, clearing within these creeklines should be avoided.

7. *Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.*

Localised erosion has occurred in some areas where native vegetation has been cleared for track construction, generally on steep inclines from the plains to the mesa tops, and particularly where these tracks have been neither maintained nor rehabilitated (Plate 5.1). Measures should be put in place to limit erosion associated with vegetation clearance. Some degradation through weed invasion is also evident, principally along the major creeklines where Buffel Grass sometimes forms closed tussock grasslands. Weed management measures should be implemented prior to any clearing in the Beasley River area to minimise the spread of existing weeds and the potential for introduction of new species.



Plate 5.1: Localised erosion on a track from the plain to a mesa top, north of the Beasley River.

8. *Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.*

There are no conservation areas in the vicinity of the Beasley River study area that would be impacted by vegetation clearing within this area.

9. *Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.*

The creeklines within the study area would only flow during seasonal flood events. As long as the clearing in the area is of a relatively small scale (tracks etc.), there is no reason to expect that surface or groundwater quality in the area would be affected. Where possible, clearing of the creek vegetation should, however, be avoided (see Appendix 1 for a list of vegetation types associated with drainage areas).

10. *Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.*

Flooding of the creeklines and low-lying habitats in the Beasley River study area may occur periodically as a result of heavy rainfall triggered by cyclonic activity and sporadic thunderstorms. Limited clearing within the study area would not be expected to exacerbate either the frequency or the intensity of flooding through these areas.

6.0 Discussion and Recommendations

6.1 Summary of Findings

6.1.1 Vegetation

The vegetation of the Beasley River study area was predominantly in Very Good to Excellent condition. The presence of weeds is currently the most serious degrading influence and the vegetation in some sections of major creeklines is in a Very Poor condition due to significant **Cenchrus ciliaris* (Buffel Grass) infestation.

Two vegetation types have been identified as having High Conservation Significance, based on the authors knowledge of the Pilbara bioregion. AxDIPa is described as *Acacia xiphophylla* (Snakewood) tall open shrubland over *Dipteracanthus australasicus* subsp. *australasicus* scattered low shrubs, and occurs on cracking clay on top of mesas. AxTaTlo is described as *Acacia xiphophylla* (Snakewood) scattered tall shrubs to shrubland over *Triodia angusta*, *T. longiceps* very open hummock grassland, and occurs on sandy plains to the south of the Beasley River. Significant populations of *P. trichocephalus* were recorded in this vegetation type, and it is recommended that, if possible, this should not be further disturbed. A further eight vegetation types were identified as being of Moderate conservation significance (Section 3.2). Statistical analysis of the data would provide more information on the vegetation types in the Beasley River study area, and allow the conservation significance to be refined and confirmed.

6.1.2 Flora

Four species of Priority Flora have been identified within the Beasley River study area. Three distinct populations of *Ptilotus trichocephalus* (Priority 1) were recorded on sandy plains south of the Beasley River and these populations should not be disturbed. *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301) (Priority 3) occurred in small drainage lines on the western edge of the study area. *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (Priority 3) was recorded by Emil Thoma (botanist with RTIO) in an area of cracking clay on top of a mesa. *Ptilotus subspinescens* (Priority 3) occurs primarily on calcrete soils on the lower slopes of mesas and the adjacent plains (see Section 4.1 for further details on the four species).

Eleven species of introduced flora were recorded in the Beasley River study area, none of which are subject to actions under the *Agriculture and Related Resources Protection Act 1976* (**Argemone ochroleuca* subsp. *ochroleuca* and **Datura leichhardtii* are listed, however the Shire of Ashburton is excluded as an area for action). Four species (**Aerva javanica*, **Cenchrus ciliaris*, **Cenchrus setiger* and **Vachellia farnesiana*) are considered to be serious environmental weeds (see Section 4.2 for further details).

6.2 Potential Impacts and Management Recommendations

Due to the early stage of the Beasley River development, project definition is not yet available. Given this, the potential impacts and management recommendations presented here are necessarily largely generic strategies for typical projects of a similar scale in the Pilbara. The following measures are recommended to minimise impacts to the flora and vegetation of the Beasley River study area. These also provide early advice and guidance to RTIO for other scopes of work and botanical investigations that may be required as part of preparing the Beasley River project for pre-feasibility and formal environmental assessment.

1. As this study represents a single phase survey only, and project design has not been developed, an additional phase of flora and vegetation survey work will be needed to support a formal assessment of the Beasley River project. This report will also need to be expanded on completion of this additional phase, and the remaining recommendations

below implemented, to bring the flora and vegetation assessment for the study area to full formal assessment standards.

2. Any development areas should be systematically searched for rare flora prior to construction (note that searches for the Priority 1 *Ptilotus trichocephalus* should be conducted during the flowering season, in late August to September).
3. The locations of flora of conservation significance reported here should be captured into RTIO's Geographical Information System (GIS), and avoided if possible. The three large populations of *Ptilotus trichocephalus* should not be disturbed, and the significance of these areas should be brought to the attention of all staff and contractors working in the area.
4. The conservation significance of vegetation types should be reviewed following statistical analysis of the vegetation data.
5. Disturbance to vegetation types of conservation significance, particularly AxTaTlo, AxDIPa and vegetation in drainage areas, should be avoided where possible. Where disturbance in drainage areas is unavoidable, measures should be put in place to maintain surface water flows.
6. The clearing of vegetation should be kept to the minimum necessary for safe construction and operation of the project, particularly in areas near vegetation of conservation interest.
7. Weed control measures should be developed and implemented to prevent the spread of weeds.
8. A Fire Management Plan should be developed and implemented to minimise the possibility of increased fire incidences.
9. A Topsoil Management and Rehabilitation Plan should be prepared for all non-permanent cleared areas, in liaison with DEC and the Department of Mines and Petroleum prior to the commencement of construction activities. This plan should include use of provenance collected native seed, characterisation and management of topsoil, and the respreading of cleared vegetative material. Recovery monitoring should also be carried out, with any rehabilitation failure subject to additional treatment to a suitable standard.

7.0 References

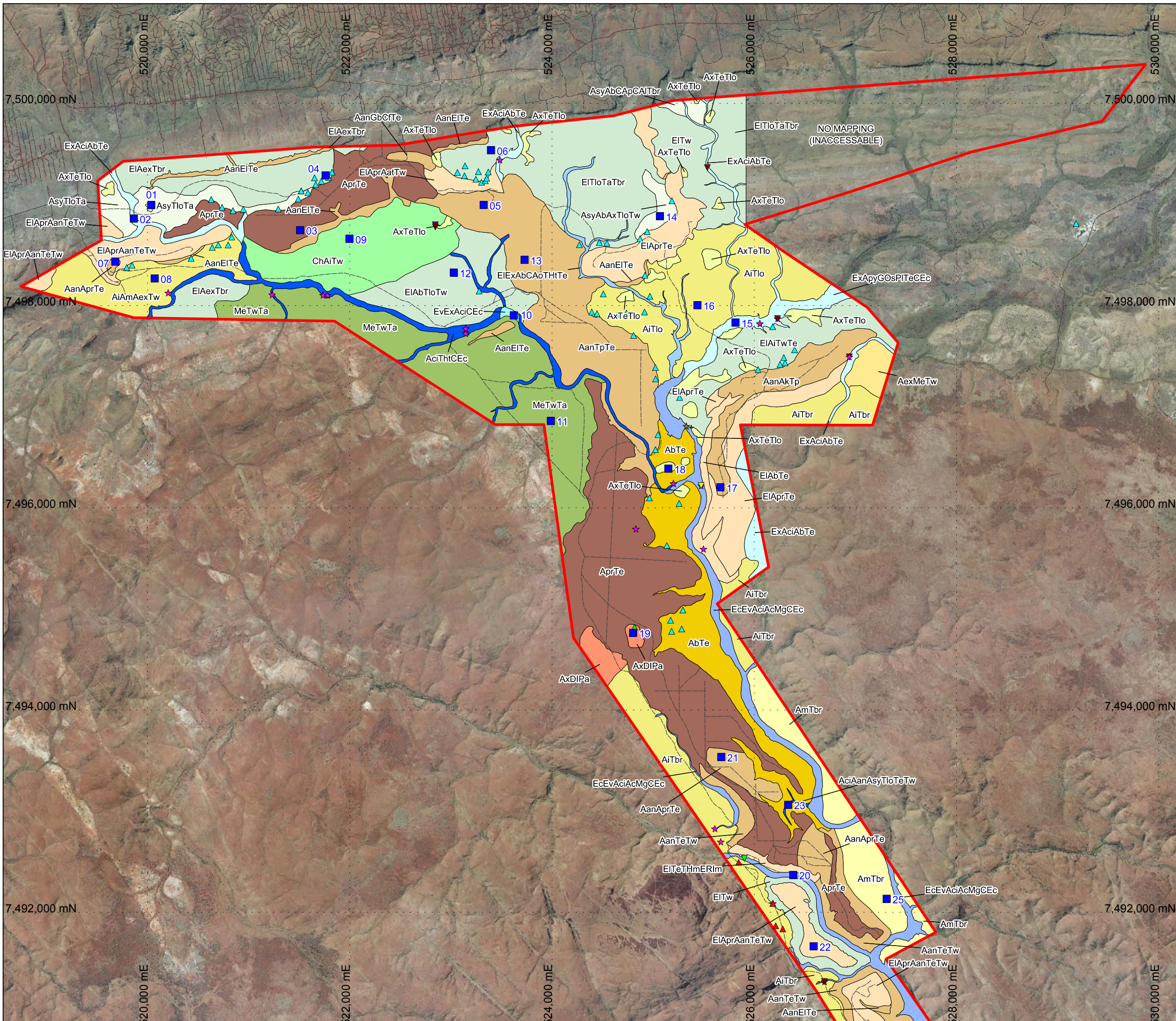
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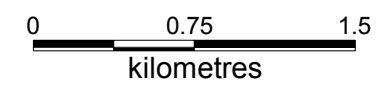
Appendix 1

Vegetation Mapping and Vegetation Type Descriptions for the Beasley River Study Area



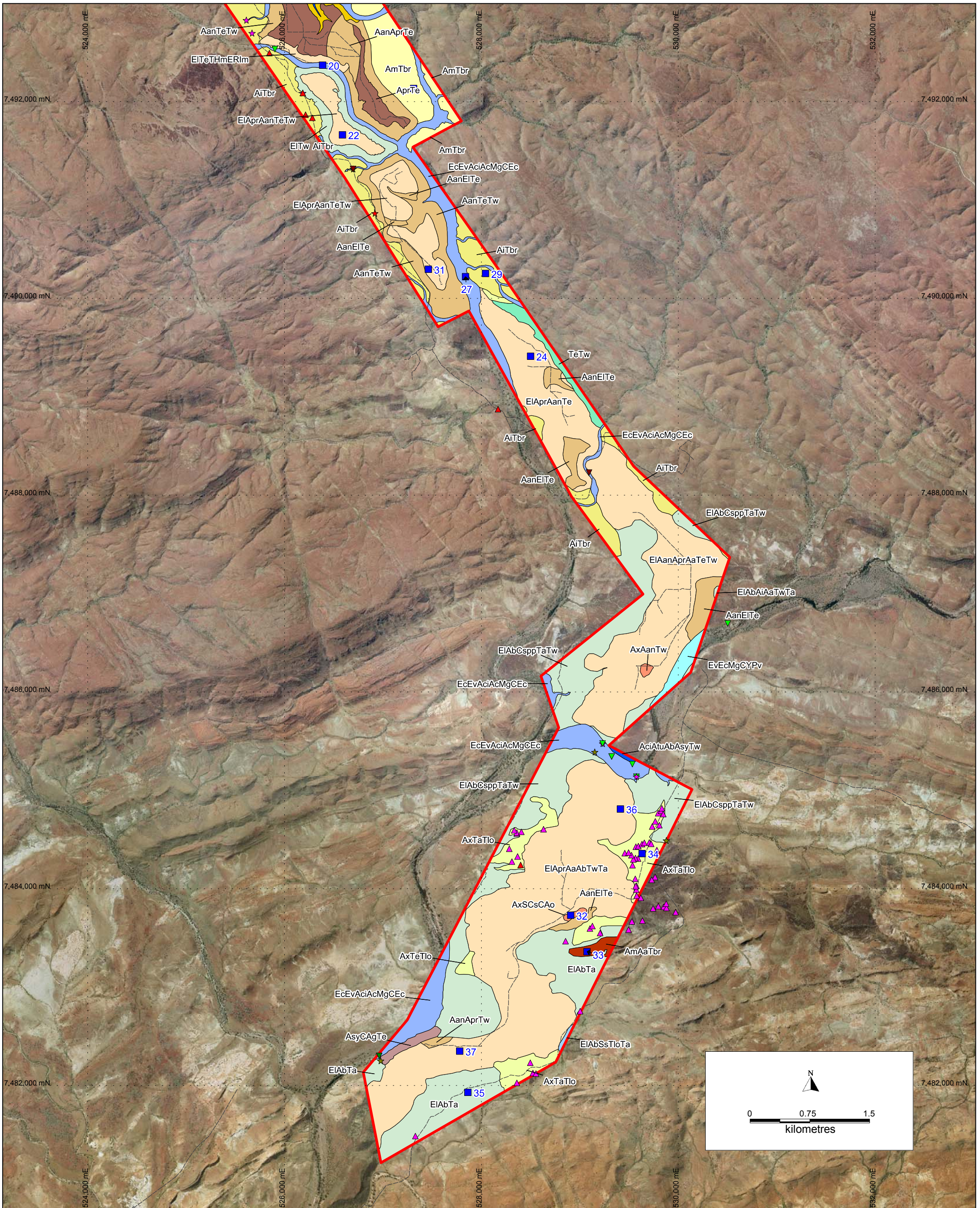


- Quadrat
 - Survey Boundary
 - Track
- Priority species**
- ▲ *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301)
 - ▲ *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479)
 - ▲ *Ptilotus subspinescens*
 - ▲ *Ptilotus trichocephalus*
- Weeds**
- ★ *Aerva javanica*
 - ▼ *Argemone ochroleuca* subsp. *ochroleuca*
 - ▼ *Bidens bipinnata*
 - ★ *Cenchrus ciliaris*
 - ▼ *Cenchrus setiger*
 - ▼ *Datura leichhardtii*
 - ▼ *Malvastrum americanum*
 - ▼ *Melochia pyramidata*
 - ▼ *Portulaca oleracea*
 - ▼ *Setaria verticillata*
 - ★ *Vachellia farnesiana*



**Beasley River
Flora Mapping - Nov 2009
North Sheet**

Author: Melinda Trudgen	Date: 13/11/2009
Drawn: A Brown	Revised:
Job No.: 525	Report No.:
Projection: MGA94 Zone 50	Scale: 1:35,000



- Quadrat
- Survey Boundary
- Track

Priority species

- ▲ *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301)
- ▲ *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479)
- ▲ *Ptilotus subspinescens*
- ▲ *Ptilotus trichocephalus*

Weeds

- ★ *Aerva javanica*
- ▼ *Argemone ochroleuca* subsp. *ochroleuca*
- ▼ *Bidens bipinnata*

- ★ *Cenchrus ciliaris*
- ▼ *Cenchrus setiger*
- ▼ *Datura leichhardtii*
- ▼ *Malvastrum americanum*
- ▼ *Melochia pyramidata*
- ▼ *Portulaca oleracea*
- ▼ *Setaria verticillata*
- ★ *Vachellia farnesiana*



**Beasley River
Flora Mapping - Nov 2009
South Sheet**







Author: Melinda Trudgen	Date: 13/11/2009
Drawn: A Brown	Revised:
Dwg No.: 525	Report No.:
Projection: MGA94 Zone 50	Scale: 1:35,000

Vegetation of Beasley River








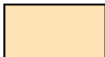







Drainage areas

	AciAanAsyTloTeTw	<i>Acacia citrinoviridis</i> , <i>A. aneura</i> tall open shrubland over <i>A. synchronicia</i> open shrubland over <i>Triodia longiceps</i> , <i>T. epactia</i> , <i>T. wiseana</i> open hummock grassland
	AciAtuAbAsyTw	<i>Acacia citrinoviridis</i> , <i>A. tumida</i> , <i>A. bivenosa</i> , <i>A. synchronicia</i> tall shrubland over <i>Triodia wiseana</i> hummock grassland
	AciThtCEc	<i>Acacia citrinoviridis</i> tall shrubland over <i>Themeda triandra</i> , * <i>Cenchrus ciliaris</i> tussock grassland
	ChAciAbTloTa	<i>Corymbia hamersleyana</i> scattered low trees over <i>Acacia citrinoviridis</i> , <i>A. bivenosa</i> tall shrubland over <i>Triodia longiceps</i> , <i>T. angusta</i> hummock grassland
	EcEvAciAcMgCEc	<i>Eucalyptus camaldulensis</i> , <i>E. victrix</i> open woodland over <i>Acacia citrinoviridis</i> , <i>A. coriacea</i> subsp. <i>pendens</i> , <i>Melaleuca glomerata</i> tall shrubland over * <i>Cenchrus ciliaris</i> very open tussock grassland
	EIAbSsTloTa	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia bivenosa</i> , <i>Stylobasium spathulatum</i> open shrubland over <i>Triodia longiceps</i> , <i>T. angusta</i> open hummock grassland
	EIExAbCAoTHtTe	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> , <i>E. xerothermica</i> low woodland over <i>Acacia bivenosa</i> , <i>Cassia oligophylla</i> shrubland over <i>Themeda triandra</i> tussock grassland and <i>Triodia epactia</i> hummock grassland
	EvEcMgCYPv	<i>Eucalyptus victrix</i> , <i>E. camaldulensis</i> open forest over <i>Melaleuca glomerata</i> tall shrubland over <i>Cyperus vaginatus</i> sedgeland
	EvExAciCEc	<i>Eucalyptus victrix</i> , <i>E. xerothermica</i> open woodland over <i>Acacia citrinoviridis</i> tall closed scrub over * <i>Cenchrus ciliaris</i> closed tussock grassland
	ExAciAbTe	<i>Eucalyptus xerothermica</i> scattered trees to open woodland over <i>Acacia citrinoviridis</i> , <i>A. bivenosa</i> (tall) shrubs to closed shrubland over <i>Triodia epactia</i> very open hummock grassland to open hummock grassland
	ExApyGOSPITeCEc	<i>Eucalyptus xerothermica</i> low open woodland over <i>Acacia pyrifolia</i> , <i>Gossypium sturtianum</i> var. <i>sturtianum</i> , <i>Petalostylis labicheoides</i> tall shrubland over <i>Triodia epactia</i> hummock grassland and * <i>Cenchrus ciliaris</i> closed tussock grassland.


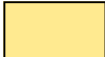
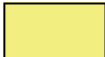
Hills, mesas and slopes

	AanAkTp	<i>Acacia aneura</i> , <i>A. kempeana</i> tall open shrubland over <i>Triodia pungens</i> hummock grassland
	AanAprTe	<i>Acacia aneura</i> , <i>A. pruinocarpa</i> low woodland to low open woodland <i>Triodia epactia</i> hummock grassland
	AanAprTw	<i>Acacia aneura</i> low open woodland over <i>A. pruinocarpa</i> scattered shrubs over <i>Triodia wiseana</i> hummock grassland
	AanEITe	<i>Acacia aneura</i> , <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open forest over <i>Triodia epactia</i> hummock grassland
	AanGbCfTe	<i>Acacia aneura</i> , <i>Grevillea berryana</i> , <i>Corymbia ferritcola</i> low open forest over <i>Triodia epactia</i> hummock grassland
	AanTeTw	<i>Acacia aneura</i> scattered low trees over <i>Triodia epactia</i> , <i>T. wiseana</i> open hummock grassland



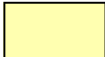

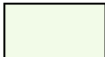

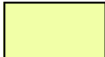
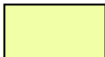
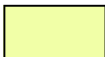
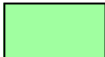





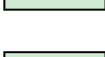
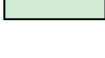

Hills, mesas and slopes (cont)

	AanTpTe	<i>Acacia aneura</i> low woodland over <i>Triodia pungens</i> , <i>T. epactia</i> hummock grassland
	AmAaTbr	<i>Acacia maitlandii</i> , <i>A. ancistrocarpa</i> tall open shrubland over <i>Triodia brizoides</i> open hummock grassland
	AprTe	<i>Acacia pruinocarpa</i> open shrubland over <i>Triodia epactia</i> hummock grassland
	AsyCAGTe	<i>Acacia synchronicia</i> , <i>Cassia glutinosa</i> open shrubland over <i>Triodia epactia</i> open hummock grassland
	AxAanTw	<i>Acacia xiphophylla</i> , <i>A. aneura</i> tall shrubland over <i>Triodia wiseana</i> open hummock grassland
	AxDIPa	<i>Acacia xiphophylla</i> tall open shrubland over <i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i> scattered low shrubs
	AxSCsCAo	<i>Acacia xiphophylla</i> tall open shrubland over <i>Scaevola spinescens</i> , <i>Cassia oligophylla</i> scattered low shrubs
	EIAanAprAaTeTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia aneura</i> , <i>A. pruinocarpa</i> , <i>A. ancistrocarpa</i> scattered shrubs to shrubland over <i>Triodia epactia</i> , <i>T. wiseana</i> hummock grassland
	EIAbTe	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia bivenosa</i> open shrubland over <i>Triodia epactia</i> hummock grassland
	EIAprAaAbTwTa	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia pruinocarpa</i> , <i>A. ancistrocarpa</i> , <i>A. bivenosa</i> scattered shrubs over <i>Triodia wiseana</i> , <i>T. angusta</i> open hummock grassland to hummock grassland
	EIAprAanTe	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia pruinocarpa</i> , <i>A. aneura</i> tall open shrubland over <i>Triodia epactia</i> hummock grassland
	EIAprAanTeTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia pruinocarpa</i> , <i>A. aneura</i> scattered shrubs over <i>Triodia epactia</i> , <i>T. wiseana</i> hummock grassland
	EIAprAatTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia pruinocarpa</i> , <i>A. atkinsiana</i> open shrubland over <i>Triodia wiseana</i> hummock grassland
	EIAprTe	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia pruinocarpa</i> open shrubland over <i>Triodia epactia</i> hummock grassland
	EITeTHmERIm	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Triodia epactia</i> hummock grassland and <i>Themeda</i> sp. Mt Barricade (M.E. Trudgen 2471), <i>Eriachne mucronata</i> tussock grassland

Plains and small undulating hills

	AbTe	<i>Acacia bivenosa</i> open shrubland over <i>Triodia epactia</i> hummock grassland
	AexMeTw	<i>Acacia exilis</i> , <i>Melaleuca eleuterostachya</i> open shrubland over <i>Triodia wiseana</i> hummock grassland
	AiAmAexTw	<i>Acacia inaequilatera</i> , <i>A. maitlandii</i> , <i>A. exilis</i> scattered shrubs over <i>Triodia wiseana</i> open hummock grassland

Plains and small undulating hills (cont)

	AiTbr	<i>Acacia inaequilatera</i> open shrubland to shrubland over <i>Triodia brizoides</i> hummock grassland
	AiTlo	<i>Acacia inaequilatera</i> tall open shrubland over <i>Triodia longiceps</i> hummock grassland
	AmTbr	<i>Acacia maitlandii</i> open shrubland over <i>Triodia brizoides</i> open hummock grassland
	AsyAbAxTloTw	<i>Acacia synchronicia</i> , <i>A. bivenosa</i> , <i>A. xiphophylla</i> scattered shrubs over <i>Triodia longiceps</i> , <i>T. wiseana</i> open hummock grassland
	AsyAbCApCAITb	<i>Acacia synchronicia</i> , <i>A. bivenosa</i> , <i>Cassia pruinosa</i> , <i>C. luerssenii</i> shrubland over <i>Triodia brizoides</i> hummock grassland
	AsyTloTa	<i>Acacia synchronicia</i> open shrubland over <i>Triodia longiceps</i> , <i>T. angusta</i> open hummock grassland
	AxCAITw	<i>Acacia xiphophylla</i> scattered tall shrubs over <i>Cassia luerssenii</i> open shrubland over <i>Triodia wiseana</i> hummock grassland
	AxTaTlo	<i>Acacia xiphophylla</i> scattered tall shrubs to shrubland over <i>Triodia angusta</i> , <i>T. longiceps</i> very open hummock grassland
	AxTeTlo	<i>Acacia xiphophylla</i> tall open shrubland over <i>Triodia epactia</i> , <i>T. longiceps</i> hummock grassland
	ChAiTw	<i>Corymbia hamersleyana</i> scattered low trees over <i>Acacia inaequilatera</i> tall open shrubland over <i>Triodia wiseana</i> open hummock grassland
	EIAbAiAaTwTa	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia bivenosa</i> , <i>A. inaequilatera</i> , <i>A. ancistrocarpa</i> scattered shrubs over <i>Triodia wiseana</i> , <i>T. angusta</i> hummock grassland
	EIAbCspTaTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia bivenosa</i> , mixed <i>Cassia</i> species scattered low shrubs over <i>Triodia angusta</i> , <i>T. wiseana</i> hummock grassland
	EIAbTa	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia bivenosa</i> scattered shrubs over <i>Triodia angusta</i> hummock grassland
	EIAbTloTw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia bivenosa</i> scattered (tall) shrubs over <i>Triodia longiceps</i> , <i>T. wiseana</i> hummock grassland
	EIAexTbr	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia exilis</i> open shrubland to shrubland over <i>Triodia brizoides</i> hummock grassland
	EIAiTwTe	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia inaequilatera</i> scattered shrubs over <i>Triodia wiseana</i> , <i>T. epactia</i> hummock grassland
	EITloTaTbr	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Triodia longiceps</i> , <i>T. angusta</i> , <i>T. brizoides</i> hummock grassland
	EITw	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Triodia wiseana</i> hummock grassland

Plains and small undulating hills (cont)



MeTwTa

Melaleuca eleuterostachya low shrubland over *Triodia wiseana*, *Triodia angusta*
hummock grassland



TeTw

Triodia epactia, *T. wiseana* hummock grassland



Description of Vegetation Types¹

Vegetation of Drainage Areas

AciAanAsyTloTeTw *Acacia citrinoviridis*, *A. aneura* tall open shrubland over *A. synchronicia* open shrubland over *Triodia longiceps*, *T. epactia*, *T. wiseana* open hummock grassland

Occurred once in the centre of the study area as a strip of vegetation situated in the bed and banks of a prominent river. The vegetation was in good condition, with signs of cattle and the weed species **Malvastrum americanum* noted. Associated species included: *Eriachne mucronata* (typical form), *Eucalyptus leucophloia* subsp. *leucophloia*, *Petalostylis labicheoides*, *Rhagodia eremaea*, *Solanum* species. Site BRL23 was assessed within this vegetation unit.

AciAtuAbAsyTw *Acacia citrinoviridis*, *A. tumida* var. *pilbarensis*, *A. bivenosa*, *A. synchronicia* tall shrubland over *Triodia wiseana* hummock grassland

Occurred once in the south of the study area, in a small area on a lower hill slope, directly above a major drainage area. The vegetation was burnt approximately five years ago and is still showing signs of regrowth. The vegetation condition was excellent, with no weeds or other disturbance noted. Associated species included: *Acacia aneura*, *A. tetragonophylla*, *Aristida contorta*, *Cassia luerssenii*, *Eremophila cuneifolia*, *Goodenia microptera*, *Ptilotus calostachyus*, *Solanum lasiophyllum*.

AciTHCEc *Acacia citrinoviridis* tall shrubland over *Themeda triandra*, **Cenchrus ciliaris* tussock grassland

Occurred in the north to northwestern sections of the study area, following a creekline and including floodbanks. Vegetation condition was rated as good to very poor, with the weed species **Cenchrus ciliaris* dominating the understorey in places. Despite the weed infestation, this vegetation was considered to be of moderate conservation significance. Associated species included: *Acacia bivenosa*, *Eucalyptus xerothermica*, *Hakea chordophylla*, *Rulingia luteiflora*, *Triodia epactia*.

EcEvAciAcMgCEc *Eucalyptus camaldulensis*, *E. victrix* open woodland over *Acacia citrinoviridis*, *A. coriacea* subsp. *pendens*, *Melaleuca glomerata* tall shrubland over **Cenchrus ciliaris* very open tussock grassland

Occurred in the central and southern sections of the study area, in the Beasley River and another major creekline feeding into the Beasley River. Vegetation condition was poor to very poor, with cattle activity noted and the weed species **Cenchrus ciliaris* recorded as a dominant in the very open understorey. The weed **Argemone ochroleuca* subsp. *ochroleuca* was also noted in large populations, forming areas of seasonal hermland. Despite the weed infestations, this vegetation type was considered to be of moderate conservation significance. Associated species included: *Capparis spinosa* var. *nummularia*, *Cyperus vaginatus*, *Gossypium australe*, *G. robinsonii*, *G. sturtianum*, **Malvastrum americanum*, *Melaleuca glomerata*. Sites BRL20 and BRL27 were assessed within this vegetation unit.

EIAbSsTloTa *Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia bivenosa*, *Stylobasium spathulatum* open shrubland over *Triodia longiceps*, *T. angusta* open hummock grassland

Occurred once along the eastern boundary, in the southern section of the study area. This unit occupied a small area on the slopes of a mesa. The vegetation condition was excellent, with no weed species or other disturbance recorded.

EIExAbCAoTHte *Eucalyptus leucophloia* subsp. *leucophloia*, *E. xerothermica* low woodland over *Acacia bivenosa*, *Cassia oligophylla* shrubland over *Themeda triandra* tussock grassland and *Triodia epactia* hummock grassland

Occurred once in the northern section of the study area, and represents the vegetation of a creek bed and banks. The vegetation was in very good to excellent condition, with no weeds recorded. Associated species included: *Corchorus* species, *Eulalia aurea*, *Petalostylis labicheoides*, *Ptilotus exaltatus* var. *exaltatus*.

EvEcMgCYPv *Eucalyptus victrix*, *E. camaldulensis* open forest over *Melaleuca glomerata* tall shrubland over *Cyperus vaginatus* sedgeland

Occurred once in the southern section of the study area, and included an area of the Beasley River and adjacent floodplain. The vegetation condition was good, with the weed species **Argemone oleracea* and occasional **Cenchrus ciliaris* recorded. This vegetation type was regarded as having moderate conservation significance. Associated species included: *Acacia coriacea*, *Ipomoea plebeia*.

¹ Description of vegetation types prepared by Carmel Winton and Melinda S. Trudgen (Biota)

EvExAcicEc *Eucalyptus victrix*, *E. xerothermica* open woodland over *Acacia citrinoviridis* tall closed scrub over **Cenchrus ciliaris* closed tussock grassland

Occurred in the central northern section of the study area, on a small area of river bed, surrounded by a similar vegetation unit, AcitHtCEc. The vegetation was in very poor condition, with up to 80% of the ground story dominated by the serious environmental weed **Cenchrus ciliaris*, numerous other weed species present, and indications of frequent cattle activity. Despite the very poor condition of the vegetation, this unit was considered to be of moderate conservation significance. Associated species included: **Bidens bipinnata*, *Capparis lasiantha*, **Cenchrus setiger*, *Duperreya commixta*, **Malvastrum americanum*, *Petalostylis labicheoides*, *Themeda triandra*. Quadrat BRL10 was assessed within this vegetation unit.

ExApyGOsPITeCEc *Eucalyptus xerothermica* low open woodland over *Acacia pyrifolia*, *Gossypium sturtianum* var. *sturtianum*, *Petalostylis labicheoides* tall shrubland over *Triodia epactia* hummock grassland and **Cenchrus ciliaris* closed tussock grassland

Occurred in the northeastern section of the survey area. This unit represented vegetation of some minor tributaries and the upper reaches of a major creekline. The vegetation is in poor to very poor condition with up to 90% of the ground story dominated by the serious environmental weed **Cenchrus ciliaris*, and indications of frequent cattle activity. Despite the degraded condition of the vegetation, this unit was regarded as having moderate conservation significance. Associated species included: *Cleome viscosa*, *Gossypium robinsonii*, *Themeda triandra*. Quadrat BRL15 was assessed within this vegetation unit.

Vegetation of Hills, Mesas and Slopes**AanAkTp *Acacia aneura*, *A. kempeana* tall open shrubland over *Triodia pungens* hummock grassland**

Occurred in the northeastern section of the study area, on the rocky top of a long narrow mesa. The vegetation is in very good to excellent condition with no signs of disturbance noted. The area was burnt approximately five years ago and the vegetation is still showing signs of regrowth. Associated species included: *Acacia pruinocarpa*, *Cassia* species, *Corchorus sidoides*, *Eremophila forrestii*, *Goodenia microptera*, *Sida* species, *Triodia epactia*. Quadrat BRL17 was assessed within this vegetation unit.

AanAprTe *Acacia aneura*, *A. pruinocarpa* low woodland to low open woodland *Triodia epactia* hummock grassland

Occurred in three areas: one small area in the northwest and two larger areas in the central section of the study area. This unit typically occurred on flat mesa tops. Vegetation condition was excellent, with no disturbances noted. The area was burnt approximately five years ago. Associated species included: *Cassia* species, *Grevillea berryana*, *Hibiscus burtonii*, *Solanum lasiophyllum*, *Tribulus suberosus*. Quadrats BRL07 and BRL21 were assessed within this vegetation unit.

AanAprTw *Acacia aneura* low open woodland over *A. pruinocarpa* scattered shrubs over *Triodia wiseana* hummock grassland

Occurred once in the southern section of the study area. This unit comprised a small area of dense vegetation surrounded by a similar vegetation type, ElAprAaAbTwTa. This vegetation occurred on a mesa top, and was in excellent condition.

AanEITe *Acacia aneura*, *Eucalyptus leucophloia* subsp. *leucophloia* low open forest over *Triodia epactia* hummock grassland

Occurred 13 times throughout the study area, predominately on south- to southeast-facing slopes of mesas and hills, sometimes extending to the mesa top. It was considered to be of moderate conservation significance. The vegetation condition was very good to excellent, with no weed species recorded. Associated species included: *Acacia citrinoviridis*, *A. pruinocarpa*, *A. pyrifolia*, *Eremophila forrestii*, *Ptilotus* species, *Solanum lasiophyllum*.

AanGbCfte *Acacia aneura*, *Grevillea berryana*, *Corymbia ferricola* low open forest over *Triodia epactia* hummock grassland

Occurs once in the northern centre of the study area, on the gently undulating top of a mesa. The vegetation condition was excellent, with no weeds or disturbance recorded. Associated species included: *Acacia citrinoviridis*, *A. marramamba*, *A. rhodophloia*, *Eremophila exilifolia*, *Eucalyptus leucophloia* subsp. *leucophloia*, *Grevillea berryana*.

AanTeTw *Acacia aneura* scattered low trees over *Triodia epactia*, *T. wiseana* open hummock grassland

Occurred four times in the centre of the study area, on the slopes of prominent mesas along the river. This

vegetation type occurred between the high density weed infestations of a major creekline at the base of the mesa, and the mesa crest, on which weeds were typically absent.

AanTpTe *Acacia aneura* low woodland over *Triodia pungens*, *T. epactia* hummock grassland

Occurred once in the central northern section of the study area, on the gently undulating top of a prominent mesa. This vegetation was in very good to excellent condition. Associated species included: *Cassia* species, *Codonocarpus cotinifolius*, *Gossypium sturtianum* var. *sturtianum*, *Iseilema dolichotrichum*, *Ptilotus schwartzii* var. *schwartzii*, *Solanum diversiflorum*. Quadrats BRL05 and BRL13 were assessed within this vegetation unit.

AmAaTbr *Acacia maitlandii*, *A. ancistrocarpa* tall open shrubland over *Triodia brizoides* open hummock grassland

Occurred once in the southeastern section of the study area, on a north-facing hill slope with a medium gradient. The area was burnt less than five years ago. The vegetation was in excellent condition. Associated species included: *Cassia glutinosa*, *Eriachne mucronata*, *Ptilotus schwartzii* var. *schwartzii*, *Tribulus suberosus*. Quadrat BRL33 was assessed within this vegetation unit.

AprTe *Acacia pruinocarpa* open shrubland over *Triodia epactia* hummock grassland

Occurred on the northwestern and central plains of the study area, and was the most dominant vegetation of the undulating plains. The vegetation in this unit was in good to excellent condition. Associated species included: *Acacia bivenosa*, *A. maitlandii*, *Cassia* species, *Eriachne mucronata*, *Gossypium* species. Quadrat BRL03 was assessed within this vegetation unit.

AsyCAgTe *Acacia synchronica*, *Cassia glutinosa* open shrubland over *Triodia epactia* open hummock grassland

Occurred once in the southern section of the study area, on flat plains at the base of a mesa. The vegetation condition was excellent, with no weeds or other disturbances recorded. Associated species included: *Solanum horridum*.

AxAanTw *Acacia xiphophylla*, *A. aneura* tall shrubland over *Triodia wiseana* open hummock grassland

Occurred once, south of the centre of the study area, as a small vegetation community on a hill crest surrounded by prominent vegetation unit, EIAanAprAaTeTw. It was of moderate conservation significance. The vegetation was in good condition, due to the presence of an old track and the weed species **Malvastrum americanum*.

AxDIPa *Acacia xiphophylla* tall open shrubland over *Dipteracanthus australasicus* subsp. *australasicus* scattered low shrubs

Occurred twice in the centre of the study area. This unit represents an uncommon vegetation type for the study area, situated on an area of cracking clay on top of a mesa. The unit was of high conservation significance, and is of interest for its unusual floristic composition and association with an unusual habitat for the locality. This vegetation was in very good condition. Associated species included: *Cassia oligophylla* x *helmsii*, *Eremophila cuneifolia*, *Streptoglossa bubakii*, *Triodia epactia*. Quadrat BRL19 was assessed within this vegetation unit.

AxSCsCAo *Acacia xiphophylla* tall open shrubland over *Scaevola spinescens*, *Cassia oligophylla* scattered low shrubs

Occurred once in the southern section of the study area, at the edge of a mesa top. This vegetation type was considered to be of moderate conservation significance. The vegetation condition was very good, with a track adjacent to it and the weed species **Malvastrum americanum* present. Associated species included: *Eremophila cuneifolia*, *Streptoglossa bubakii*, *Tribulus suberosus*, *Triodia wiseana*. Quadrat BRL32 was assessed within this vegetation unit.

EIAanAprAaTeTw *Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia aneura*, *A. pruinocarpa*, *A. ancistrocarpa* scattered shrubs to shrubland over *Triodia epactia*, *T. wiseana* hummock grassland

Occurred once, as a prominent vegetation unit in the south of the central section of the study area. This unit represented the main vegetation on hills between the Beasley River and the other major creekline in the study area. The vegetation was in very good to excellent condition, with no weeds recorded and old tracks which supported regenerating vegetation. Associated species included: *Acacia citrinoviridis*, *Codonocarpus cotinifolius*, *Goodenia stobbsiana*, *Ptilotus schwartzii* var. *schwartzii*.

EIAbTe *Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia bivenosa* open shrubland over *Triodia epactia* hummock grassland

Occurred once in the northern third of the study area, on the western-facing slope of a mesa following

the river. Scattered occurrences of the serious environmental weed *Cenchrus ciliaris*, reduce the condition of this vegetation type to very good. Associated species included: *Acacia pruinocarpa*, *Triodia angusta*.

EIAprAaAbTwTa ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia pruinocarpa*, *A. ancistrocarpa*, *A. bivenosa* scattered shrubs over *Triodia wiseana*, *T. angusta* open hummock grassland to hummock grassland**

Occurred once in the southern section of the study area, where it is the dominant vegetation. The vegetation condition is excellent, with no weeds species recorded. Associated species included: *Cassia glutinosa*, *Eremophila cuneifolia*, *Ptilotus astrolasius*, *P. obovatus* var. *obovatus*, *Solanum lasiophyllum*, *Tribulus suberosus*. Quadrats BRL36 and BRL37 were assessed within this vegetation unit.

EIAprAanTe ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia pruinocarpa*, *A. aneura* tall open shrubland over *Triodia epactia* hummock grassland**

Occurred once in the centre of the study area, over a large area of mesiform hills north of the Beasley River. The vegetation condition was excellent, with no weed species recorded. Associated species included: *Acacia synchronicia*, *Codonocarpus cotinifolius*, *Corchorus sidoides*, *Cymbopogon ambiguus*. Quadrat BRL24 was assessed within this vegetation unit.

EIAprAanTeTw ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia pruinocarpa*, *A. aneura* scattered shrubs over *Triodia epactia*, *T. wiseana* hummock grassland**

Occurred in the southern and northwestern sections of the study area, on the flat tops of mesas. The vegetation was in excellent condition with an absence of common weed species or major disturbance to the vegetation noted. Associated species included: *Cassia glutinosa*, *Gossypium robinsonii*, *Ptilotus calostachyus*, *Tribulus suberosus*. Quadrats BRL22 and BRL31 were assessed within this vegetation unit.

EIAprAaTtw ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia pruinocarpa*, *A. atkinsiana* open shrubland over *Triodia wiseana* hummock grassland**

Occurred once in the northern section of the study area, on a small area of undulating hills near the edge of a mesa. The vegetation condition was very good to excellent. Associated species included: *Cassia glutinosa*, *Eriachne mucronata*, *Goodenia stobbsiana*, *Indigofera monophylla*.

EIAprTe ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia pruinocarpa* open shrubland over *Triodia epactia* hummock grassland**

Occurred twice in the northeastern section of the study area. The vegetation was in an excellent condition, with no weeds or other human disturbance recorded. Associated species included: *Acacia aneura*, *Goodenia stobbsiana*, *Hakea chordophylla*, *Ptilotus* species.

EITeTHmERIm ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Triodia epactia* hummock grassland and *Themeda* sp. Mt Barricade (M.E. Trudgen 2471), *Eriachne mucronata* tussock grassland**

Occurred once in the centre of the study area, situated on the southwest-facing slope of a mesa. Considering the proximity of this unit to a major river where signs of cattle and dense environmental weeds were noted, it is likely that the vegetation condition was only good. Associated species included: *Abutilon dioicum*, *Cassia glutinosa*, *Cymbopogon ambiguus*, *Ptilotus exaltatus*, *Triodia epactia*.

Vegetation of Plains and Small Undulating Hills

AbTe ***Acacia bivenosa* open shrubland over *Triodia epactia* hummock grassland**

Occurred north of the centre of the study area, on the eastern undulating plains and hills between a mesa and a major creekline. The vegetation condition was excellent, with no weeds species or other disturbance recorded. Associated species included: *Acacia synchronicia*, *Eremophila forrestii*, *Solanum lasiophyllum*, *Triodia angusta*, *T. wiseana*.

AexMeTw ***Acacia exilis*, *Melaleuca eleuterostachya* open shrubland over *Triodia wiseana* hummock grassland**

Occurred once at the eastern border of the study area, on plains to the east of a major drainage line. Signs of a recent fire through this vegetation unit were recorded. The vegetation was in excellent condition, with no weed species recorded. Associated species included: *Cassia notabilis*, *C. oligophylla*, *Corchorus sidoides*.

AiAmAexTw ***Acacia inaequilatera*, *A. maitlandii*, *A. exilis* scattered shrubs over *Triodia wiseana***

open hummock grassland

Occurred once in the northwestern section of the study area, on the slopes and undulating plains at the base of the western mesas. The vegetation was in very good condition, with the weed species, **Cenchrus ciliaris* and some tracks recorded within the unit. Associated species included: *Cassia oligophylla* x *helmsii*, *C. pruinosa*, *Codonocarpus cotinifolius*, *Paraneurachne muelleri*, *Ptilotus exaltatus* var. *exaltatus*. Quadrat BRL08 was assessed within this vegetation unit.

AiTbr *Acacia inaequilatera* open shrubland to shrubland over *Triodia brizoides* hummock grassland

Occurred throughout the centre of the study area, over a large area of undulating plains. Occasionally different *Triodia* species replace *T. brizoides* as the dominant hummock grass. The vegetation was in good condition with the weed species **Cenchrus ciliaris* and vehicle tracks recorded throughout the area. Associated species included: *Acacia pruinocarpa*, *Cassia pruinosa*, *Eremophila forrestii* var. *forrestii*, *Triodia epactia*, *T. pungens*, *T. wiseana*. Quadrat BRL29 was assessed within this vegetation unit.

AiTlo *Acacia inaequilatera* tall open shrubland over *Triodia longiceps* hummock grassland

Occurred once in the eastern section of the study area, over undulating plains and was commonly dissected by minor north-south drainage lines. Occasionally *Triodia epactia* co-dominated the hummock grasslands. Vegetation condition was excellent with only occasional signs of cattle noted. Associated species included: *Abutilon lepidum*, *Cassia glutinosa*, *C. notabilis*, *Maireana georgei*, *M. tomentosa*. Quadrat BRL16 was assessed within this vegetation unit.

AmTbr *Acacia maitlandii* open shrubland over *Triodia brizoides* open hummock grassland

Occurred once along the eastern boundary in the centre of the study area, undulating plains following a creekline and river. The vegetation was in excellent condition with no weed species or other disturbances noted. Associated species included: *Acacia inaequilatera*, *A. tetragonophylla*, *Aristida contorta*, *Cassia* species, *Hakea lorea* subsp. *lorea*, *Ptilotus* species. Quadrat BRL25 was assessed within this vegetation unit.

AsyAbAxTloTw *Acacia synchronicia*, *A. bivenosa*, *A. xiphophylla* scattered shrubs over *Triodia longiceps*, *T. wiseana* open hummock grassland

Occurred once in the northern section of the study area, on the undulating top and western slopes of a mesa. The vegetation was in excellent condition with no weed species or disturbances noted. Associated species included: *Acacia xiphophylla*, *Aristida contorta*, *Cassia* species, *Hakea chordophylla*, *Ptilotus calostachyus*. Quadrat BRL14 was assessed within this vegetation unit.

AsyAbCApCAITbr *Acacia synchronicia*, *A. bivenosa*, *Cassia pruinosa*, *C. luerssenii* shrubland over *Triodia brizoides* hummock grassland

Occurred along the northern boundary of the study area, on mesa footslopes intersected by minor drainage channels. Vegetation condition was very good to excellent.

AsyTloTa *Acacia synchronicia* open shrubland over *Triodia longiceps*, *T. angusta* open hummock grassland

Occurred in the northwestern section of the study area, on the undulating, southern footslopes of a ridge. The vegetation was in excellent condition with no weed species or disturbances noted. Associated species included: *Acacia synchronicia*, *Ptilotus exaltatus* var. *exaltatus*, *T. brizoides*, *Triodia wiseana*. Quadrat BRL01 was assessed within this vegetation unit.

AxTaTlo *Acacia xiphophylla* scattered tall shrubs to shrubland over *Triodia angusta*, *T. longiceps* very open hummock grassland

Occurred four times in the southern section of the study area, on low undulating plains at the footslopes of mesas. The vegetation was in excellent condition with one minor track and no weed species recorded. It was of high conservation significance, and was associated with significant populations of the Priority 1 species *Ptilotus trichocephalus*. Associated species included: *Acacia aneura*, *A. inaequilatera*, *A. synchronicia*, *Hakea chordophylla*, *Melaleuca eleuterostachya*, *Triodia angusta*, *T. wiseana*. Quadrat BRL34 was assessed within this vegetation unit.

AxTeTlo *Acacia xiphophylla* tall open shrubland over *Triodia epactia*, *T. longiceps* hummock grassland

Occurred in small pockets throughout the study area, usually situated on rocky slopes or crests of undulating plains, hills, and mesas. This vegetation was in excellent condition with an absence of weed species or other disturbances noted. Associated species included: *Acacia bivenosa*, *Eremophila cuneifolia*, *Rhagodia eremaea*, *Triodia brizoides*, *T. wiseana*. Quadrat BRL18 was assessed within this vegetation unit.

ChAiTw ***Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* tall open shrubland over *Triodia wiseana* open hummock grassland**

Occurred in the northwestern section of the study area, on undulating footslopes. The vegetation was in excellent condition with no weed species or other disturbances recorded. Associated species included: *Acacia ancistrocarpa*, *A. maitlandii*, *Paraneurachne muelleri*, *Triodia epactia*. Quadrat BRL09 was assessed within this vegetation unit.

EIAbAiAaTwTa ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia bivenosa*, *A. inaequilatera*, *A. ancistrocarpa* scattered shrubs over *Triodia wiseana*, *T. angusta* hummock grassland**

Occurred once along the eastern boundary in the southern section of the study area. The vegetation condition was very good.

EIAbCspptTaTw ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia bivenosa*, mixed *Cassia* species scattered low shrubs over *Triodia angusta*, *T. wiseana* hummock grassland**

Occurred throughout the southern section of the study area, on mesa slopes and extending onto the plains. The vegetation condition was very good to excellent, with no weed species and only occasional tracks recorded. Associated species included: *Acacia synchronicia*, *A. tetragonophylla*, *Corymbia hamersleyana*, *Eremophila cuneifolia*, *E. fraseri*, *Ptilotus obovatus* var. *obovatus*, *Sclerolaena eriacantha*.

EIAbTa ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia bivenosa* scattered shrubs over *Triodia angusta* hummock grassland**

Occurred at the southernmost end of the study area, on east- to southeastern-facing mesa slopes and undulating footslope plains. The vegetation was in excellent condition with no weed species or other disturbance recorded. Associated species included: *Acacia synchronicia*, *Cassia glutinosa*, *C. pruinosa*, *Eremophila cuneifolia*, *Stylobasium spathulatum*, *Triodia epactia*, *T. longiceps*, *T. wiseana*. Quadrat BRL35 was assessed within this vegetation unit.

EIAexTbr ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia exilis* open shrubland to shrubland over *Triodia brizoides* hummock grassland**

Occurred in the northeastern section of the study area, on plains and small hills. Taking into account the absence of weed species and disturbance, the vegetation was in very good to excellent condition. Associated species included: *Acacia bivenosa*, *Cassia glutinosa*, *Ptilotus calostachyus*, *Triodia longiceps*.

EIAiTwTe ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Acacia inaequilatera* scattered shrubs over *Triodia wiseana*, *T. epactia* hummock grassland**

Occurred once in the northeastern section of the study area, on a plain between major creek tributaries. Given the proximity of common weed species in the surrounding vegetation, this vegetation unit was likely to have been in good condition. Associated species included: *Acacia exilis*, *Hibiscus coatesii*, *Sida arsinata*, *S. echinocarpa*.

EITloTaTbr ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Triodia longiceps*, *T. angusta*, *T. brizoides* hummock grassland**

Occurred in three large areas across the northern edge of the study area, on plains at the base of a mesa. This vegetation was in excellent condition, with no weed species or disturbance noted. Associated species included: *Acacia bivenosa*, *A. maitlandii*, *A. victoriae*, *Cassia glutinosa*, *C. luerssenii*. Quadrats BRL04 and BRL06 were assessed within this vegetation unit.

EITw ***Eucalyptus leucophloia* subsp. *leucophloia* scattered low trees over *Triodia wiseana* hummock grassland**

Occurred twice, once in the north and once in the centre of the study area. The northern location was situated adjacent to a mesa. The central occurrence surrounded a mesa, comprising the slope vegetation. Taking into account the presence of the weed species **Cenchrus ciliaris* and **Malvastrum americanum*, the vegetation was in good condition. Associated species included: *Acacia synchronicia*, *Bulbostylis barbata*, *Ptilotus calostachyus*, *Triodia angusta*.

TeTw ***Triodia epactia*, *T. wiseana* hummock grassland**

Occurred once in the southeastern section of the study area, on a northeast facing mesa slope, extending onto the adjacent undulating plain. This vegetation was in very good to excellent condition, with no common weed species or other disturbance noted. Associated species included: *Acacia aneura*, *A. ancistrocarpa*, *A. pruinocarpa*.

Appendix 2

Flora Species List for the Beasley River Study Area



NB. As per the limitations discussed in the main report, please note that this species list should be regarded as indicative and that other species may occur.

Fungi and non-vascular flora were not the focus of this study, however some opportunistic records have been included at the end of this species list.

* denotes an introduced (weed) species.

The use of the genus *Cassia* has been retained in favour of *Senna*, as it is felt to reflect a more realistic separation of taxa. All other nomenclature reflects current scientific names accepted by the Western Australian Herbarium. Correspondence of *Cassia* / *Senna* nomenclature is given below:

<i>Cassia glaucifolia</i>	=	<i>Senna glaucifolia</i>
<i>Cassia glutinosa</i>	=	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>
<i>Cassia glutinosa</i> x <i>luerssenii</i>	=	<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x subsp. x <i>luerssenii</i>
<i>Cassia hamersleyensis</i> x sp. Karijini (MET 10,392)	=	<i>Senna hamersleyensis</i> x sp. Karijini (M.E. Trudgen 10392)
<i>Cassia helmsii</i>	=	<i>Senna artemisioides</i> subsp. <i>helmsii</i>
<i>Cassia luerssenii</i>	=	<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>
<i>Cassia notabilis</i>	=	<i>Senna notabilis</i>
<i>Cassia oligophylla</i>	=	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>
<i>Cassia oligophylla</i> (thinly sericeous MET 15,035)	=	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thinly sericeous MET 15,035)
<i>Cassia oligophylla</i> x <i>helmsii</i>	=	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x subsp. <i>helmsii</i>
<i>Cassia pruinosa</i>	=	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>
<i>Cassia pruinosa</i> x <i>luerssenii</i>	=	<i>Senna glutinosa</i> subsp. <i>pruinosa</i> x subsp. x <i>luerssenii</i>
<i>Cassia stricta</i>	=	<i>Senna stricta</i>

Family: Acanthaceae (325)

Dicladanthera forrestii
Dipteracanthus australasicus subsp. *australasicus*
Hamieria kempeana subsp. *muelleri*

Family: Adiantaceae (7)

Cheilanthes brownii
Cheilanthes sieberi subsp. *sieberi*

Family: Amaranthaceae (106)

Alternanthera nana
Alternanthera nodiflora
Amaranthus undulatus
Gomphrena canescens
Gomphrena cunninghamii
Gomphrena kanisii
Ptilotus aervoides
Ptilotus astrolasius var. *astrolasius*
Ptilotus auriculifolius
Ptilotus calostachyus
Ptilotus carinatus
Ptilotus clementii
Ptilotus exaltatus var. *exaltatus*
Ptilotus incanus
Ptilotus murrayi
Ptilotus obovatus
Ptilotus rotundifolius
Ptilotus schwartzii var. *schwartzii*
Ptilotus subspinescens
Ptilotus trichocephalus

Family: Apiaceae (281)

Trachymene oleracea subsp. *oleracea*

Family: Asteraceae (345)

**Bidens bipinnata*
Centipeda minima subsp. *macrocephala*
Flaveria australasica subsp. *australasica*
Pentalepis trichodesmoides
Peripleura arida
Peripleura obovata
Pluchea ferdinandi-muelleri
Pluchea rubelliflora
Pterocaulon sphaeranthoides
Rhodanthe margarethae

- Streptoglossa bubakii*
Streptoglossa decurrens
Streptoglossa sp.
- Family: Boraginaceae (310)**
Heliotropium ammophilum
Heliotropium cunninghamii
Heliotropium heteranthum
Heliotropium inexplicitum
Heliotropium pachyphyllum
Trichodesma zeylanicum var. *zeylanicum*
- Family: Brassicaceae (138)**
Lepidium ? *muelleri-ferdinandii*
Lepidium oxytrichum
Lepidium pedicellosum
Lepidium pholidogynum
- Family: Caesalpiniaceae (164)**
Cassia glaucifolia
Cassia glutinosa
Cassia glutinosa x *luerssenii*
Cassia hamersleyensis x sp. Karijini (MET 10 392)
Cassia helmsii
Cassia luerssenii
Cassia notabilis
Cassia oligophylla
Cassia oligophylla (thinly sericeous MET 15,035)
Cassia oligophylla x *helmsii*
Cassia pruinosa
Cassia pruinosa x *luerssenii*
Cassia stricta
Petalostylis labicheoides
- Family: Capparaceae (137A)**
Capparis lasiantha
Capparis spinosa var. *nummularia*
Capparis umbonata
Cleome viscosa
- Family: Caryophyllaceae (113)**
Polycarpaea holtzei
Polycarpaea longiflora
- Family: Chenopodiaceae (105)**
Enchylaena tomentosa var. *tomentosa*
Maireana eriosphaera
Maireana georgei
Maireana melanocoma
Maireana planifolia
Maireana thesioides
Maireana tomentosa
Maireana villosa
Rhagodia eremaea
Salsola australis
Salsola tragus subsp. *tragus*
Sclerolaena costata
Sclerolaena cuneata
Sclerolaena densiflora
Sclerolaena eriacantha
Tecticornia disarticulata
- Family: Convolvulaceae (307)**
Bonamia media var. *villosa*
Bonamia rosea
Convolvulus angustissimus subsp. *angustissimus*
Duperreya commixta
Evolvulus alsinoides var. *decumbens*
Evolvulus alsinoides var. *villosicalyx*
Ipomoea muelleri
Ipomoea plebeia
Polymeria ambigua
Polymeria aff. *ambigua* (CGC-25)
Polymeria aff. *ambigua* (MET12,302)

	<i>Polymeria</i> aff. <i>ambigua</i> (PAN 26B-20)
Family: Cucurbitaceae (337)	<i>Austrobryonia pilbarensis</i> <i>Cucumis maderaspatanus</i>
Family: Cyperaceae (32)	<i>Bulbostylis barbata</i> <i>Cyperus bifax</i> <i>Cyperus vaginatus</i> <i>Schoenoplectus litoralis</i>
Family: Euphorbiaceae (185)	<i>Adriana tomentosa</i> var. <i>tomentosa</i> <i>Euphorbia</i> aff. <i>australis</i> <i>Euphorbia biconvexa</i> <i>Euphorbia boophthona</i> <i>Euphorbia coghlanii</i> <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> (Hamersley form) <i>Euphorbia</i> sp. (B34-11) <i>Euphorbia</i> sp. (BPBS10-50) <i>Euphorbia</i> sp. (site 1089) <i>Phyllanthus maderaspatensis</i>
Family: Frankeniaceae (236)	<i>Frankenia hispidula</i>
Family: Goodeniaceae (341)	<i>Dampiera candidans</i> <i>Goodenia forrestii</i> <i>Goodenia microptera</i> <i>Goodenia muelleriana</i> <i>Goodenia stobbsiana</i> <i>Scaevola acacioides</i> <i>Scaevola spinescens</i>
Family: Gyrostemonaceae (108)	<i>Codonocarpus cotinifolius</i>
Family: Haloragaceae (276)	<i>Haloragis gossei</i> var. <i>gossei</i>
Family: Lamiaceae (313)	<i>Clerodendrum floribundum</i> var. <i>angustifolium</i> <i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>
Family: Lauraceae (131)	<i>Cassytha capillaris</i>
Family: Loranthaceae (97)	<i>Amyema fitzgeraldii</i> <i>Lysiana casuarinae</i>
Family: Lythraceae (265)	<i>Ammannia baccifera</i>
Family: Malvaceae (221)	<i>Abutilon amplum</i> <i>Abutilon cunninghamii</i> <i>Abutilon dioicum</i> <i>Abutilon fraseri</i> <i>Abutilon lepidum</i> <i>Abutilon</i> aff. <i>lepidum</i> (4) <i>Abutilon otocarpum</i> (acute leaf form) <i>Gossypium australe</i> (Burrup Peninsula form) <i>Gossypium australe</i> (Whim Creek form) <i>Gossypium robinsonii</i> <i>Gossypium sturtianum</i> var. <i>sturtianum</i> <i>Hibiscus brachychlaenus</i> <i>Hibiscus burtonii</i> <i>Hibiscus coatesii</i> <i>Hibiscus</i> aff. <i>coatesii</i> (site 693) <i>Hibiscus goldsworthii</i> <i>Hibiscus</i> aff. <i>platyklamys</i> (MET 15,067) <i>Hibiscus sturtii</i> var. aff. <i>grandiflorus</i> <i>Hibiscus sturtii</i> var. <i>campylochlamys</i> <i>Lawrencia densiflora</i> * <i>Malvastrum americanum</i> <i>Sida arsinata</i>

Sida cardiophylla
Sida echinocarpa
Sida aff. *echinocarpa* (MET 15,350)
Sida aff. *fibulifera* (HD200-6)
Sida aff. *fibulifera* (HD237-9)
Sida aff. *fibulifera* (oblong; MET 15 220)
Sida aff. *fibulifera* var. L
Sida spinosa
Sida sp. dark green fruit (S. van Leeuwen 2260)
Sida sp. Pilbara (A.A. Mitchell PRP 1543) (ferruginous form)
Sida sp. spiciform panicles (E. Leyland s.n. 14/8/90)
Sida sp. verrucose glands (F.H. Mollemans 2423)

Family: Mimosaceae (163)

Acacia ampliceps
Acacia ancistrocarpa
Acacia aneura var. ? *aneura/intermedia*
Acacia aneura var. *intermedia*
Acacia aff. *aneura* (grey flat recurved tips; MET 15,828)
Acacia aff. *aneura* (narrow fine veined; site 1259)
Acacia atkinsiana
Acacia ayersiana
Acacia bivenosa
Acacia citrinoviridis
Acacia coriacea subsp. *pendens*
Acacia exilis
Acacia hamersleyensis
Acacia inaequilatera
Acacia kempeana
Acacia maitlandii
Acacia marramamba
Acacia monticola
Acacia pruinocarpa
Acacia pyrifolia var. *morrisonii*
Acacia pyrifolia var. *pyrifolia*
Acacia rhodophloia
Acacia sibirica
Acacia sibirica (crowded smaller phyllodes)
Acacia aff. *sibirica* (linear form)
Acacia synchronicia
Acacia tetragonophylla
Acacia tumida var. *pilbarensis*
Acacia victoriae
Acacia xiphophylla
Neptunia dimorphantha
**Vachellia farnesiana*

Family: Molluginaceae (110A)

Glinus lotoides
Mollugo molluginea

Family: Myoporaceae (326)

Eremophila cuneifolia
Eremophila exilifolia
Eremophila forrestii subsp. *forrestii*
Eremophila forrestii x *latrobei*
Eremophila fraseri
Eremophila latrobei subsp. *filiformis*
Eremophila longifolia

Family: Myrtaceae (273)

Corymbia hamersleyana
Corymbia ferriticola
Eucalyptus camaldulensis
Eucalyptus leucophloia subsp. *leucophloia*
Eucalyptus socialis subsp. *eucentrica*
Eucalyptus victrix
Eucalyptus xerothermica
Melaleuca bracteata
Melaleuca eleuterostachya
Melaleuca glomerata

Family: Nyctaginaceae (107)	<i>Boerhavia coccinea</i>
Family: Oleaceae (301)	<i>Jasminum didymum</i> subsp. <i>lineare</i>
Family: Papaveraceae (135)	* <i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>
Family: Papilionaceae (165)	<i>Alysicarpus muelleri</i> <i>Crotalaria medicaginea</i> var. <i>neglecta</i> <i>Cullen leucochaïtes</i> <i>Glycine canescens</i> <i>Indigofera monophylla</i> (Cape Preston form) <i>Indigofera</i> sp. Bungaroo Creek (S. van Leeuwen 4301) PN <i>Rhynchosia minima</i> <i>Sesbania cannabina</i> <i>Templetonia egena</i> <i>Tephrosia clementii</i> <i>Tephrosia rosea</i> var. <i>glabrior</i> <i>Tephrosia</i> aff. <i>supina</i> (HD133-20) <i>Vigna lanceolata</i>
Family: Poaceae (31)	<i>Amphipogon sericeus</i> <i>Aristida burbidgeae</i> <i>Aristida contorta</i> <i>Aristida holathera</i> var. <i>holathera</i> <i>Aristida latifolia</i> <i>Bothriochloa ewartiana</i> <i>Brachyachne convergens</i> <i>Brachyachne prostrata</i> * <i>Cenchrus ciliaris</i> * <i>Cenchrus setiger</i> <i>Chrysopogon fallax</i> <i>Cymbopogon ambiguus</i> <i>Dichanthium sericeum</i> subsp. <i>humilius</i> <i>Digitaria brownii</i> <i>Enneapogon caeruleus</i> <i>Enneapogon lindleyanus</i> <i>Enneapogon polyphyllus</i> <i>Enneapogon robustissimus</i> <i>Eragrostis eriopoda</i> <i>Eragrostis exigua</i> <i>Eragrostis setifolia</i> <i>Eragrostis tenellula</i> <i>Eragrostis xerophila</i> <i>Eriachne aristidea</i> <i>Eriachne mucronata</i> (arid form) (MET 12 736) <i>Eriachne mucronata</i> (typical form) <i>Eriachne obtusa</i> <i>Eriachne pulchella</i> subsp. <i>pulchella</i> <i>Eriachne tenuiculmis</i> <i>Eulalia aurea</i> <i>Iseilema dolichotrichum</i> <i>Iseilema macratherum</i> <i>Leptochloa digitata</i> <i>Panicum laevinode</i> <i>Paraneurachne muelleri</i> <i>Paspalidium clementii</i> * <i>Setaria verticillata</i> <i>Sorghum plumosum</i> <i>Sporobolus australasicus</i> <i>Themeda triandra</i> <i>Themeda</i> sp. Mt Barricade (M.E. Trudgen 2471) <i>Triodia angusta</i> <i>Triodia brizoides</i> <i>Triodia epactia</i> <i>Triodia</i> aff. <i>epactia</i> <i>Triodia longiceps</i>

	<i>Triodia</i> aff. <i>pungens</i> <i>Triodia wiseana</i>
Family: Portulacaceae (111)	<i>Calandrinia</i> sp. <i>Portulaca conspicua</i> * <i>Portulaca oleracea</i>
Family: Primulaceae (293)	<i>Samolus</i> sp. Millstream (M.I.H. Brooker 2076)
Family: Proteaceae (90)	<i>Grevillea berryana</i> <i>Grevillea pyramidalis</i> <i>Hakea chordophylla</i> <i>Hakea lorea</i> subsp. <i>lorea</i>
Family: Rhamnaceae (215)	<i>Ventilago viminalis</i>
Family: Rubiaceae (331)	<i>Oldenlandia crouchiana</i> <i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479) <i>Psydrax suaveolens</i>
Family: Santalaceae (92)	<i>Exocarpos sparteus</i> <i>Santalum lanceolatum</i>
Family: Sapindaceae (207)	<i>Dodonaea coriacea</i> <i>Dodonaea pachyneura</i> <i>Dodonaea petiolaris</i>
Family: Scrophulariaceae (316)	<i>Stemodia grossa</i>
Family: Solanaceae (315)	* <i>Datura leichhardtii</i> <i>Nicotiana benthamiana</i> <i>Nicotiana</i> ? <i>occidentalis</i> subsp. <i>occidentalis</i> <i>Solanum diversiflorum</i> <i>Solanum gabriellae</i> <i>Solanum horridum</i> <i>Solanum lasiophyllum</i> <i>Solanum phlomoides</i> <i>Solanum sturtianum</i>
Family: Sterculiaceae (223)	<i>Keraudrenia nephrosperma</i> <i>Melhania oblongifolia</i> <i>Melhania</i> sp. (CH15-39) <i>Melhania</i> sp. Turee Creek (MJ1-35) * <i>Melochia pyramidata</i> <i>Rulingia luteiflora</i> <i>Waltheria indica</i>
Family: Surianaceae (160)	<i>Stylobasium spathulatum</i>
Family: Tiliaceae (220)	<i>Corchorus crozophorifolius</i> <i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i> <i>Corchorus lasiocarpus</i> subsp. <i>parvus</i> <i>Corchorus</i> aff. <i>parviflorus</i> <i>Corchorus sidoides</i> <i>Corchorus tridens</i> <i>Triumfetta clementii</i>
Family: Violaceae (243)	<i>Hybanthus aurantiacus</i>
Family: Zygophyllaceae (173)	<i>Tribulus hirsutus</i> <i>Tribulus suberosus</i>
Fungi and Non-vascular Flora	
Family: Coriolaceae (Fungi)	<i>Perenniporia ochroleuca</i> <i>Pycnoporus coccineus</i>
Family: Ganodermataceae (Fungi)	<i>Ganoderma steyaertanum</i>

Family: Podaxaceae (Fungi)	<i>Podaxis pistillaris</i>
Family: Sclerodermataceae (Fungi)	<i>Pisolithus</i> sp.
Family: (Moss)	Bryophyta (moss)
Family: Ricciaceae (Liverwort)	<i>Riccia</i> sp. (Liverwort)

Appendix 3

Raw Data from Quadrats Assessed in the Beasley River Study Area



Beasley River	Site BRL01		
Described by	J. Fairhead & P. Anderson	Date 20/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 520004	mE 7499003	mN
Habitat	Undulating, gently sloping plain		
Soil	Red brown sandy loam		
Rock	Fe stone, continuous layer of pebbles and cobbles		
Vegetation	<i>Acacia synchronicia</i> scattered shrubs over <i>Triodia angusta</i> , <i>Triodia longiceps</i> (<i>Triodia wiseana</i>) hummock grassland		
Veg Condition	Excellent		
Fire Age	> 5 years		
Beasley River	Site BRL02		
Described by	M. Maier & M.S. Trudgen	Date 20/5/2009	Quadrat size 15 x 150 m
AMG Zone	50 519830	mE 7498928	mN
Habitat	SW creek bank, in rolling plain between mesas. Less than 1m elevation difference between creek bed and banks.		
Soil	Red brown clay loam		
Rock	Cobbles and pebbles		
Vegetation	<i>Eucalyptus xerothermica</i> scattered low trees over <i>Acacia bivenosa</i> , <i>Acacia citrinoviridis</i> (<i>Rulingia luteiflora</i> , <i>Petalostylis labicheoides</i>) tall open scrub over <i>Triodia angusta</i> , <i>Triodia epactia</i> very open hummock grassland and <i>Themeda triandra</i> scattered tussock		
Veg Condition	Good		
Fire Age	>5 years		
Notes	* <i>Cenchrus ciliaris</i> , * <i>Bidens bipinnata</i> and * <i>Malvastrum americanum</i> all present		
Beasley River	Site BRL03		
Described by	J. Fairhead & P. Anderson	Date 20/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 521476	mE 7498756	mN
Habitat	Undulating crest on top of mesa		
Soil	Red brown sandy loam		
Rock	Fe stone, continuous surface layer of pebbles and cobbles		
Vegetation	<i>Acacia pruinocarpa</i> open shrubland over <i>Triodia epactia</i> open hummock grassland over <i>Amphipogon sericeus</i> , <i>Eriachne mucronata</i> (typical form) very open tussock grassland		
Veg Condition	Very Good to Excellent		
Fire Age	> 5 years		
Notes	Site flagged only		
Beasley River	Site BRL04		
Described by	M. Maier & M.S. Trudgen	Date 20/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 521726	mE 7499285	mN
Habitat	Stony plain, next to small flow line, adjacent to small mesa, gently sloping west		
Soil	Red brown silty loam		
Rock	Manganese and chert, pebbles and cobbles		
Vegetation	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Triodia longiceps</i> hummock grassland		
Veg Condition	Excellent		
Fire Age	>5 years		
Notes	Approximately 25 individuals of <i>Ptilotus subspinescens</i>		
Beasley River	Site BRL05		
Described by	J. Fairhead & P. Anderson	Date 20/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 523299	mE 7499015	mN
Habitat	Flat plain on top of mesa		
Soil	red-brown sandy loam		
Rock	Fe stone, continuous layer of pebbles and cobbles		
Vegetation	<i>Acacia</i> aff. <i>aneura</i> (narrow fine veined; Site 1259) low woodland over <i>Triodia</i> aff. <i>pungens</i> very open hummock grassland		
Veg Condition	Very good - Excellent		
Fire Age	<2 years		

Beasley River	Site BRL06			
Described by	M. Maier & M.S. Trudgen	Date	20/5/2009	Quadrat size 40 x 40 m
AMG Zone	50 523374 mE		7499552 mN	
Habitat	Gently sloping spur of mesa sloping to the west			
Soil	Red brown silty loam			
Rock	Fe stone, pebbles and cobbles			
Vegetation	<i>Triodia brizoides</i> , <i>Triodia longiceps</i> hummock grassland			
Veg Condition	Excellent			
Fire Age	> 5 years			
Notes	Quadrat size reduced due to patchy fire history			
Beasley River	Site BRL07			
Described by	J. Fairhead & P. Anderson	Date	21/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 519651 mE		7498452 mN	
Habitat	Gently undulating plain on top of mesa			
Soil	Red brown sandy loam			
Rock	Fe stone, continuous layer surface layer of pebbles and cobbles			
Vegetation	<i>Acacia</i> aff. <i>aneura</i> (narrow fine veined; Site 1259), <i>Acacia aneura</i> var. <i>intermedia</i> (<i>Acacia pruinocarpa</i>) low woodland over <i>Eremophila forrestii</i> , <i>Tribulus suberosus</i> low open shrubland over <i>Triodia epactia</i> hummock grassland			
Veg Condition	Excellent			
Fire Age	> 5 years			
Beasley River	Site BRL08			
Described by	M.S. Trudgen	Date	21/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 520035 mE		7498274 mN	
Habitat	Crest of gently sloping ridge in an undulating plain			
Soil	Red brown sandy loam			
Rock	Fe stone, pebbles and cobbles, some out cropping dolerite			
Vegetation	<i>Acacia inaequilatera</i> tall open shrubland over <i>Triodia wiseana</i> hummock grassland			
Veg Condition	Excellent			
Fire Age	No sign of recent fire			
Beasley River	Site BRL09			
Described by	J. Fairhead & P. Anderson	Date	21/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 521962 mE		7498674 mN	
Habitat	Rocky outcropping ridge in an undulating plain at the foot of a mesa			
Soil	Red brown sandy loam			
Rock	Fe stone, Boulders and smaller			
Vegetation	<i>Acacia maitlandii</i> tall shrubland over <i>Triodia</i> aff. <i>pungens</i> , <i>Triodia wiseana</i> hummock grassland and <i>Paraneurachne muelleri</i> , <i>Themeda triandra</i> open tussock grassland			
Veg Condition	Excellent			
Fire Age	> 5 years			
Beasley River	Site BRL10			
Described by	M.S. Trudgen	Date	21/5/2009	Quadrat size 25 x 100 m
AMG Zone	50 523587 mE		7497913 mN	
Habitat	Raised bank (1 - 1.5 m) of creek bed, north of a small mesa			
Soil	Red brown silty loam			
Rock				
Vegetation	<i>Eucalyptus victrix</i> , <i>Eucalyptus xerothermica</i> open woodland over <i>Acacia citrinoviridis</i> tall closed scrub over <i>*Cenchrus ciliaris</i> closed tussock grassland			
Veg Condition	Very Poor			
Fire Age	No signs fire			
Notes	Vegetation dominated by <i>Triodia</i> on the upslope side (excluded from quadrat). Numerous signs of cattle, including cattle 'runs' along creek. Understorey completely dominated by <i>*Cenchrus ciliaris</i> .			

Beasley River	Site BRL11			
Described by	J. Fairhead & P. Anderson	Date	21/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 523988	mE	7496859	mN
Habitat	Very gently undulating calcrete plain at base of mesa			
Soil	Red brown cracking clay			
Rock	Calcrete, dolerite and quartz, pebbles and cobbles			
Vegetation	<i>Acacia exilis</i> , <i>Petalostylis labicheoides</i> open shrubland over <i>Triodia angusta</i> , <i>Triodia wiseana</i> very open hummock grassland			
Veg Condition	Excellent			
Fire Age	3-5 years			
Beasley River	Site BRL12			
Described by	M.S. Trudgen	Date	21/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 522996	mE	7498336	mN
Habitat	North facing sloping plain			
Soil	Red brown silty loam			
Rock	Fe stone, pebbles and cobbles			
Vegetation	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Acacia bivenosa</i> scattered (tall) shrubs over <i>Triodia longiceps</i> , <i>Triodia brizoides</i> hummock grassland.			
Veg Condition	Excellent			
Fire Age	No sign of recent fire			
Beasley River	Site BRL13			
Described by	J. Fairhead & P. Anderson	Date	22/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 523721	mE	7498485	mN
Habitat	Flat plain on top of mesa			
Soil	Red brown sandy clay			
Rock	Fe stone, continuous surface layer of gravel, pebbles and cobbles			
Vegetation	<i>Acacia</i> aff. <i>aneura</i> (narrow fine veined; Site 1259), <i>Acacia aneura</i> var. ? <i>aneura/intermedia</i> low open woodland over <i>Triodia epactia</i> hummock grassland			
Veg Condition	Very good			
Fire Age	2 years			
Notes	Most of surrounding area burnt. Quadrat area mostly intact			
Beasley River	Site BRL14			
Described by	M.S. Trudgen	Date	22/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 525044	mE	7498911	mN
Habitat	Gently sloping spur, grading into an undulating plain			
Soil	Red brown sandy clay			
Rock	Fe stone, scattered pebbles and cobbles			
Vegetation	Mixed <i>Acacia synchronicia</i> , <i>Acacia bivenosa</i> , <i>Acacia xiphophylla</i> scattered shrubs over <i>Triodia wiseana</i> , <i>Triodia longiceps</i> open hummock grassland			
Veg Condition	Excellent			
Fire Age	No sign of recent fire			
Beasley River	Site BRL15			
Described by	J. Fairhead & P. Anderson	Date	22/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 525785	mE	7497844	mN
Habitat	Wide gently undulating river bank			
Soil	red brown clay			
Vegetation	<i>Corymbia hamersleyana</i> low open woodland over <i>Gossypium sturtianum</i> , <i>Acacia citrinoviridis</i> , <i>Petalostylis labicheoides</i> tall shrubland over <i>Acacia pyrifolia</i> open shrubland over * <i>Cenchrus ciliaris</i> closed tussock grassland			
Veg Condition	Very Poor			
Fire Age	> 5 years			
Notes	Extensive * <i>Cenchrus ciliaris</i> invasion and clear signs of cattle			

Beasley River	Site BRL16			
Described by	M.S. Trudgen	Date	22/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 525404 mE	7498015 mN		
Habitat	Gently sloping plain, mesa's to the north and west			
Soil	red brown sandy clay			
Rock	Manganese and quartz pebbles			
Vegetation	<i>Acacia synchronicia</i> scattered tall shrubs over <i>Triodia longiceps</i> hummock grassland			
Veg Condition	Excellent			
Fire Age	No sign of recent fire			
Notes	Occasional signs of cattle. Mature <i>Triodia longiceps</i> , spreading out from dead centres			
Beasley River	Site BRL17			
Described by	J. Fairhead & P. Anderson	Date	23/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 525643 mE	7496229 mN		
Habitat	Rocky plain on mesa			
Soil	Red brown clay loam			
Rock	Fe stone, continuous layer of pebbles and cobbles			
Vegetation	<i>Acacia aneura</i> var. ? <i>aneura/intermedia</i> , <i>Acacia kempeana</i> tall open shrubland over <i>Triodia aff. pungens</i> hummock grassland			
Veg Condition	Very good to Excellent			
Fire Age	> 5 years			
Beasley River	Site BRL18			
Described by	M.S. Trudgen	Date	23/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 525130 mE	7496414 mN		
Habitat	Slight crest of a broadly sloping plain, in a basin between Mesas			
Soil	Red brown sandy loam			
Rock	Fe stone, pebbles and scattered cobbles			
Vegetation	<i>Acacia xiphophylla</i> low woodland over <i>Triodia longiceps</i> open hummock grassland			
Veg Condition	Excellent			
Fire Age	No sign of recent fire			
Beasley River	Site BRL19			
Described by	J. Fairhead & P. Anderson	Date	23/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 524771 mE	7494776 mN		
Habitat	Cracking clay flat on top of mesa			
Soil	Red brown cracking clay			
Rock	Quartz pebbles, Iron stone pebbles and cobbles			
Vegetation	<i>Acacia xiphophylla</i> low open woodland over <i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i> scattered low shrubs			
Veg Condition	Very good			
Fire Age	> 5 years			
Beasley River	Site BRL20			
Described by	M.S. Trudgen & P. Hoffman	Date	25/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 526362 mE	7492395 mN		
Habitat	Creek bed, between steep sloped mesas			
Soil	Red brown sandy loam			
Rock	Cobbles and scattered pebbles			
Vegetation	<i>Eucalyptus victrix</i> open forest over <i>Acacia citrinoviridis</i> , <i>Melaleuca glomerata</i> tall open scrub over <i>Melaleuca bracteata</i> shrubland over * <i>Cenchrus ciliaris</i> tussock grassland and <i>Cyperus vaginatus</i> very open tussock grassland			
Veg Condition	Very good			
Fire Age	No sign of recent fire			
Notes	Some signs of cattle			

Beasley River	Site BRL21			
Described by	J. Fairhead & P. Anderson	Date	22/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 525646	mE	7493556	mN
Habitat	Flat plain on top of Mesa			
Soil	Red brown clay loam			
Rock	Fe stone pebbles and cobbles with scattered quartz pebbles			
Vegetation	<i>Acacia</i> aff. <i>aneura</i> (narrow fine veined; Site 1259) low open woodland over <i>Acacia pruinocarpa</i> scattered low shrubs over <i>Triodia</i> aff. <i>epactia</i> hummock grassland			
Veg Condition	Excellent			
Fire Age	> 5 years			
Notes	Site not permanently marked due to proximity of Heritage area. Area surrounding quadrat has been burnt more recently.			
Beasley River	Site BRL22			
Described by	M.S. Trudgen & P. Hoffman	Date	25/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 526563	mE	7491692	mN
Habitat	Level plain on top of a mesa			
Soil	Red brown sandy loam			
Rock	Pebbles and scattered cobbles			
Vegetation	<i>Eucalyptus leucophloia</i> scattered low trees over <i>Acacia pruinocarpa</i> (<i>Acacia</i> aff. <i>aneura</i> (narrow fine veined; Site 1259)) tall shrubland over <i>Triodia wiseana</i> , <i>Triodia</i> aff. <i>pungens</i> hummock grassland			
Veg Condition	Excellent			
Fire Age	> 5 years			
Beasley River	Site BRL23			
Described by	J. Fairhead & P. Anderson	Date	25/5/2009	Quadrat size
AMG Zone	50 526289	mE	7493041	mN
Habitat	Creek bed and banks			
Soil	Red brown sandy clay			
Rock	Ironstone continuous layer of pebbles and cobbles			
Vegetation	<i>Acacia citrinoviridis</i> (<i>Acacia</i> aff. <i>aneura</i> (narrow fine veined; Site 1259)) tall open scrub over <i>Acacia synchronicia</i> , <i>Dodonaea pachyneura</i> open shrubland over <i>Triodia longiceps</i> , <i>Triodia epactia</i> (<i>Triodia wiseana</i>) open hummock grassland			
Veg Condition	Good			
Fire Age	> 5 years			
Notes	Signs of Cattle and * <i>Malvastrum americanum</i>			
Beasley River	Site BRL24			
Described by	M.S. Trudgen	Date	26/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 528473	mE	7489440	mN
Habitat	Crest of gently sloping patch on mesa top			
Soil	Red brown sandy loam			
Rock	Cobbles and pebbles and low outcropping rocks			
Vegetation	<i>Acacia pruinocarpa</i> tall open scrub over <i>Triodia epactia</i> hummock grassland			
Veg Condition	Excellent			
Fire Age	No sign of recent fire			
Beasley River	Site BRL25			
Described by	J. Fairhead & P. Anderson	Date	25/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 527275	mE	7492136	mN
Habitat	Undulating hills east of creek line and mesa, West of Beasley River			
Soil	Red brown clay loam			
Rock	Ironstone, continuous surface of boulders cobbles and pebbles. Outcropping quartz			
Vegetation	<i>Acacia maitlandii</i> open shrubland over <i>Triodia brizoides</i> open hummock grassland			
Veg Condition	Excellent			
Fire Age	3-5 years			

Beasley River	Site BRL27		
Described by	J. Fairhead & P. Anderson	Date 26/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 527805 mE 7490231 mN		
Habitat	Creekbank - floodplain next to Beasley River below mesa		
Soil	Red brown sandy loam		
Rock	Non-continuous cobbles and pebbles - river stones		
Vegetation	<i>Eucalyptus victrix</i> open woodland over <i>Acacia citrinoviridis</i> , <i>Grevillea pyramidalis</i> tall open shrubland over * <i>Cenchrus ciliaris</i> very open tussock grassland		
Veg Condition	Poor - Good		
Fire Age	> 5 years		
Beasley River	Site BRL29		
Described by	J. Fairhead & P. Anderson	Date 26/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 528031 mE 7490287 mN		
Habitat			
Soil	Red brown clayey sand		
Rock	Fe stone. Intermittent pebbles and cobbles		
Vegetation	<i>Acacia inaequilatera</i> scattered tall shrubs over <i>Eremophila forrestii</i> scattered shrubs over <i>Triodia brizoides</i> open hummock grassland and <i>Aristida contorta</i> scattered tussock grasses		
Veg Condition	Very good		
Fire Age	3-5 years		
Beasley River	Site BRL31		
Described by	J. Fairhead & P. Anderson	Date 26/5/2009	Quadrat size 50 x 50 m
AMG Zone	50 527429 mE 7490294 mN		
Habitat	Flat plain on top of Mesa		
Soil	Red brown clayey loam		
Rock	Fe stone, Continuous layer of pebbles and cobbles		
Vegetation	<i>Acacia</i> aff. <i>aneura</i> (narrow fine veined; Site 1259) low open woodland over <i>Triodia epactia</i> open hummock grassland		
Veg Condition	Excellent		
Fire Age	> 5 years		
Notes	Surrounded by burnt area. Not staked due to proximity of Heritage area		
Beasley River	Site BRL32		
Described by	J. Fairhead	Date 8/09/2009	Quadrat size 35 x 85 m
AMG Zone	50 528866 mE 7483728 mN		
Habitat	Broad gently undulating plain on mesa		
Soil	Red brown clay		
Rock	Fe stones, continuous surface layer of pebbles		
Vegetation	<i>Acacia xiphophylla</i> low open woodland over <i>Scaevola spinescens</i> , <i>Cassia oligophylla</i> x <i>helmsii</i> scattered low shrubs		
Veg Condition	Very Good		
Fire Age	5 + years		
Notes	Quadrat 35 x 85 m to fit vegetation unit. Elevation 445 m		
Beasley River	Site BRL33		
Described by	J. Fairhead	Date 9/09/2009	Quadrat size 50 x 50 m
AMG Zone	50 529043 mE 7483378 mN		
Habitat	Rocky hill slope, facing north		
Soil	Red brown clay loam		
Rock	Fe stone pebbles-boulders		
Vegetation	<i>Acacia maitlandii</i> , <i>Acacia ancistrocarpa</i> tall open shrubland over <i>Triodia brizoides</i> open hummock grassland		
Veg Condition	Excellent		
Fire Age	2-4 years		
Notes	Outcropping rock forms approx. 60% of quadrat		

Beasley River	Site BRL34			
Described by	J. Fairhead	Date	9/09/2009	Quadrat size 50 x 50 m
AMG Zone	50 529617 mE		7484390 mN	
Habitat	Broad open plain			
Soil	Light brown loamy clay/calcrete			
Rock	Fe sone, white quartz, calcrete gravel and pebbles			
Vegetation	<i>Triodia longiceps</i> very open hummock grassland			
Veg Condition	Excellent			
Fire Age	3-5 years			
Notes	<i>Ptilotus trichocephalus</i> population is approx. 15 individuals along the eastern boundary.			
Beasley River	Site BRL35			
Described by	J. Fairhead	Date	10/9/2009	Quadrat size 50 x 50 m
AMG Zone	50 527856 mE		7481966 mN	
Habitat	Broad undulating plain between hills, crossed by numerous small drainage lines			
Soil				
Rock	Calcrete, Fe stone pebbles and cobbles forming a continuous surface layer			
Vegetation	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> scattered low trees over <i>Triodia brizoides</i> , <i>Triodia angusta</i> hummock grassland			
Veg Condition	Excellent			
Fire Age	5 + years			
Notes	Elevation 396 m			
Beasley River	Site BRL36			
Described by	J. Fairhead & P. Anderson	Date	7/09/2009	Quadrat size 50 x 50 m
AMG Zone	50 529388 mE		7484837 mN	
Habitat	Top of mesa, rocky undulating hilltop			
Soil	Red brown clay loam			
Rock	Continuous ironstone pebbles and stones			
Vegetation	<i>Acacia pruinocarpa</i> scattered tall shrubs over <i>Triodia wiseana</i> hummock grassland			
Veg Condition	Excellent			
Fire Age	5 + years			
Beasley River	Site BRL37			
Described by	J. Fairhead	Date	8/09/2009	Quadrat size 50 x 50 m
AMG Zone	50 527749 mE		7482368 mN	
Habitat	Gently undulating plain on top of mesa			
Soil	Red brown clay loam			
Rock	Fe stone, continuous surface layer of gravel and pebbles			
Vegetation	<i>Acacia pruinocarpa</i> tall open shrubland over <i>Triodia wiseana</i> open hummock grassland			
Veg Condition	Excellent			
Fire Age	5 + years			
Notes	Elevation 458 m			

Appendix 4

Vegetation Structural Classification and Condition Scale Used for the Current Study



Vegetation Structural Classes*

Stratum	Canopy Cover (%)				
	70-100%	30-70%	10-30%	2-10%	<2%
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland	Scattered tall trees
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland	Scattered trees
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs over 2 m	Tall closed scrub	Tall open scrub	Tall shrubland	Tall open shrubland	Scattered tall shrubs
Shrubs 1-2 m	Closed heath	Open heath	Shrubland	Open shrubland	Scattered shrubs
Shrubs under 1 m	Low closed heath	Low open heath	Low shrubland	Low open shrubland	Scattered low shrubs
Hummock grasses	Closed hummock grassland	Hummock grassland	Open hummock grassland	Very open hummock grassland	Scattered hummock grasses
Grasses, Sedges, Herbs	Closed tussock grassland / bunch grassland / sedgeland / herbland	Tussock grassland / bunch grassland / sedgeland / herbland	Open tussock grassland / bunch grassland / sedgeland / herbland	Very open tussock grassland / bunch grassland / sedgeland / herbland	Scattered tussock grasses / bunch grasses / sedges / herbs

* Based on Muir (1977), and Aplin's (1979) modification of the vegetation classification system of Specht (1970): Aplin T.E.H. (1979). The Flora. Chapter 3 In O'Brien, B.J. (ed.) (1979). *Environment and Science*. University of Western Australia Press; Muir B.G. (1977). Biological Survey of the Western Australian Wheatbelt. Part II: Vegetation and habitat of Bendering Reserve. *Records of the Western Australian Museum, Suppl. No. 3*; Specht R.L. (1970). Vegetation. In *The Australian Environment*. 4th edn (Ed. G.W. Leeper). Melbourne.

Vegetation Condition Scale*

<p>E = Excellent (=Pristine of BushForever) Pristine or nearly so; no obvious signs of damage caused by the activities of European man.</p>
<p>VG = Very Good (= Excellent of BushForever) Some relatively slight signs of damage caused by the activities of European man. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds such as <i>*Ursinia anthemoides</i> or <i>*Briza</i> spp., or occasional vehicle tracks.</p>
<p>G = Good (= Very Good of BushForever) More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones such as <i>*Ehrharta</i> spp.</p>
<p>P = Poor (= Good of BushForever) Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man, such as grazing, partial clearing (chaining) or frequent fires. Weeds as above, probably plus some more aggressive ones such as <i>*Ehrharta</i> spp.</p>
<p>VP = Very Poor (= Degraded of BushForever) Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species including very aggressive species.</p>
<p>D = Completely Degraded (= Completely Degraded of BushForever) Areas that are completely or almost completely without native species in the structure of their vegetation; ie. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.</p>

* Based on Trudgen M.E. (1988). A Report on the Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.

Appendix 5

Locations and Population Counts for Priority and Introduced Species recorded in the Beasley River Study Area



Location and approximate number of individuals of Priority species recorded in the Beasley River study area.

P1 = Priority 1, P3 = Priority 3, ^ = outside the Beasley River study area.

Source	Location - Quadrat #	Easting (mE)	Northing (mN)	Elevation (m)	Approx. # individuals
<i>Ptilotus trichocephalus</i> (Priority 1)					
Biota	BRL34-04	529632	7484356	-	15
Biota	Opportunistic record	528522	7482127	396	20
Biota	Opportunistic record	528554	7482122	396	75
Biota	Opportunistic record	528309	7484275	-	15
Biota	Opportunistic record	528367	7484327	-	6
Biota	Opportunistic record	528282	7484406	-	15
Biota	Opportunistic record	528360	7484562	406	5
Biota	Opportunistic record	528360	7484570	-	5
Biota	Opportunistic record	528333	7484594	402	6
Biota	Opportunistic record	528631	7484604	-	7
Biota	Opportunistic record	528405	7484578	407	1
Biota	Opportunistic record	528855	7483466	408	5
Biota	Opportunistic record	529101	7483595	413	10
Biota	Opportunistic record	529127	7483620	415	5
Biota	Opportunistic record	529205	7483549	410	3
Biota	Opportunistic record	529495	7483583	415	5
Biota	Opportunistic record	529591	7484306	415	8
Biota	Opportunistic record	529564	7484311	417	15
Biota	Opportunistic record	529543	7484297	417	30
Biota	Opportunistic record	529535	7484238	417	4
Biota	Opportunistic record	529456	7484361	421	1
Biota	Opportunistic record	529524	7484341	416	50
Biota	Opportunistic record	529569	7484426	413	6
Biota	Opportunistic record	529594	7484432	413	7
Biota	Opportunistic record	529630	7484453	414	60
Biota	Opportunistic record	529654	7484467	413	30
Biota	Opportunistic record	529724	7484456	416	2
Biota	Opportunistic record	529807	7484646	412	2
Biota	Opportunistic record	529765	7484685	413	3
Biota	Opportunistic record	529795	7484768	411	1
Biota	Opportunistic record	529824	7484792	410	2
Biota	Opportunistic record	529832	7484818	410	2
Biota	Opportunistic record	529847	7484758	411	1
Biota	Opportunistic record	529781	7484392	418	3
Biota	Opportunistic record	529734	7484632	419	-
Biota	Opportunistic record	529575	7484029	-	13
Biota	Opportunistic record	529563	7484101	423	8
Biota	Opportunistic record	528496	7482231	402	35
Biota	Opportunistic record	529573	7483989	422	1

Source	Location - Quadrat #	Easting (mE)	Northing (mN)	Elevation (m)	Approx. # individuals
Biota	Opportunistic record	529578	7483929	420	1
Biota	Opportunistic record	527328	7481486	391	5
Biota	Opportunistic record^	529764	7484119	416	10
Biota	Opportunistic record^	529528	7483666	416	5
Biota	Opportunistic record^	529635	7483676	415	1
Biota	Opportunistic record^	529743	7483800	-	8
Biota	Opportunistic record^	529796	7483822	412	25
Biota	Opportunistic record^	529852	7483816	411	20
Biota	Opportunistic record^	529880	7483804	411	15
Biota	Opportunistic record^	529877	7483848	410	6
Biota	Opportunistic record^	529973	7483761	410	1
Biota	Opportunistic record^	529495	7484367	417	1
Biota	Opportunistic record^	529619	7483908	421	8
Biota	Opportunistic record^	529730	7484090	416	10
Rio Tinto Iron Ore	Opportunistic record	529705	7484470	-	-
Rio Tinto Iron Ore	Opportunistic record	529567	7484025	-	-
Rio Tinto Iron Ore	Opportunistic record	528360	7482027	-	-
Rio Tinto Iron Ore	Opportunistic record	529003	7482755	-	-
<i>Indigofera</i> sp. Bungaroo Creek (S. van Leeuwen 4301) (Priority 3)					
Biota	Opportunistic record	528398	7484241	403	-
Biota	Opportunistic record	526213	7491867	-	-
Biota	Opportunistic record	526185	7492088	-	-
Biota	Opportunistic record	526282	7491835	-	25
Biota	Opportunistic record	525846	7492494	-	5
Biota	Opportunistic record^	528168	7488874	-	20
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479) (Priority 3)					
Rio Tinto Iron Ore	Opportunistic record	524817	7494819	-	-
<i>Ptilotus subspinescens</i> (Priority 3)					
Biota	BRL04	521761	7499287	-	25
Biota	Opportunistic record	523141	7499383	-	22
Biota	Opportunistic record	523273	7499325	-	100
Biota	Opportunistic record	526183	7497791	-	7
Biota	Opportunistic record	526304	7497434	-	50
Biota	Opportunistic record	525257	7496043	-	24
Biota	Opportunistic record	526255	7497420	-	21
Biota	Opportunistic record	526292	7497486	-	40
Biota	Opportunistic record	526399	7497563	-	11
Biota	Opportunistic record	525262	7497092	-	50
Biota	Opportunistic record	525283	7494802	-	-
Biota	Opportunistic record	525183	7494779	-	50
Biota	Opportunistic record	523280	7498144	-	32
Biota	Opportunistic record	521520	7499135	-	80
Biota	Opportunistic record	521520	7499135	-	6

Source	Location - Quadrat #	Easting (mE)	Northing (mN)	Elevation (m)	Approx. # individuals
Biota	Opportunistic record	521652	7499264	-	10
Biota	Opportunistic record	524543	7498617	-	20
Biota	Opportunistic record	524469	7498625	-	40
Rio Tinto Iron Ore	Opportunistic record	524507	7498116	-	-
Rio Tinto Iron Ore	Opportunistic record	524394	7497937	-	-
Rio Tinto Iron Ore	Opportunistic record	524445	7497921	-	-
Rio Tinto Iron Ore	Opportunistic record	524641	7497902	-	-
Rio Tinto Iron Ore	Opportunistic record	524738	7497927	-	-
Rio Tinto Iron Ore	Opportunistic record	524915	7497937	-	-
Rio Tinto Iron Ore	Opportunistic record	524968	7498092	-	-
Rio Tinto Iron Ore	Opportunistic record	529184	7498811	-	-
Rio Tinto Iron Ore	Opportunistic record	519794	7498377	-	-
Rio Tinto Iron Ore	Opportunistic record	519848	7498400	-	-
Rio Tinto Iron Ore	Opportunistic record	520834	7498678	-	-
Rio Tinto Iron Ore	Opportunistic record	520798	7498600	-	-
Rio Tinto Iron Ore	Opportunistic record	520700	7498601	-	-
Rio Tinto Iron Ore	Opportunistic record	520641	7498576	-	-
Rio Tinto Iron Ore	Opportunistic record	520431	7498467	-	-
Rio Tinto Iron Ore	Opportunistic record	520631	7499050	-	-
Rio Tinto Iron Ore	Opportunistic record	520737	7498971	-	-
Rio Tinto Iron Ore	Opportunistic record	520947	7498952	-	-
Rio Tinto Iron Ore	Opportunistic record	520846	7498939	-	-
Rio Tinto Iron Ore	Opportunistic record	521293	7498955	-	-
Rio Tinto Iron Ore	Opportunistic record	521492	7499054	-	-
Rio Tinto Iron Ore	Opportunistic record	521587	7499117	-	-
Rio Tinto Iron Ore	Opportunistic record	521825	7499320	-	-
Rio Tinto Iron Ore	Opportunistic record	521792	7499267	-	-
Rio Tinto Iron Ore	Opportunistic record	521718	7499230	-	-
Rio Tinto Iron Ore	Opportunistic record	521664	7499198	-	-
Rio Tinto Iron Ore	Opportunistic record	523065	7499317	-	-
Rio Tinto Iron Ore	Opportunistic record	523134	7499285	-	-
Rio Tinto Iron Ore	Opportunistic record	523247	7499251	-	-
Rio Tinto Iron Ore	Opportunistic record	523304	7499220	-	-
Rio Tinto Iron Ore	Opportunistic record	523341	7499235	-	-
Rio Tinto Iron Ore	Opportunistic record	523354	7499260	-	-
Rio Tinto Iron Ore	Opportunistic record	523370	7499321	-	-
Rio Tinto Iron Ore	Opportunistic record	525023	7496576	-	-
Rio Tinto Iron Ore	Opportunistic record	525049	7496724	-	-
Rio Tinto Iron Ore	Opportunistic record	525025	7497276	-	-
Rio Tinto Iron Ore	Opportunistic record	525023	7497388	-	-
Rio Tinto Iron Ore	Opportunistic record	524807	7497706	-	-
Rio Tinto Iron Ore	Opportunistic record	524272	7498603	-	-
Rio Tinto Iron Ore	Opportunistic record	525173	7494888	-	-

Source	Location - Quadrat #	Easting (mE)	Northing (mN)	Elevation (m)	Approx. # individuals
Rio Tinto Iron Ore	Opportunistic record	525294	7494989	-	-
Rio Tinto Iron Ore	Opportunistic record	525136	7495628	-	-
Rio Tinto Iron Ore	Opportunistic record	524964	7496099	-	-
Rio Tinto Iron Ore	Opportunistic record	524870	7498661	-	-
Rio Tinto Iron Ore	Opportunistic record	524942	7498731	-	-
Rio Tinto Iron Ore	Opportunistic record	525186	7499037	-	-
Rio Tinto Iron Ore	Opportunistic record	524920	7498300	-	-
Rio Tinto Iron Ore	Opportunistic record	526037	7497368	-	-

Location and approximate number of individuals of introduced species recorded in the Beasley River study area.

Weed ratings are taken from the Environmental Weed Strategy for Western Australia (CALM 1999).

^ = outside the Beasley River study area.

Species	Common name	Weed Rating	Location - Quadrat #	Easting (mE)	Northing (mN)	Approx. # individuals
* <i>Aerva javanica</i>	Kapok Bush	High	Opportunistic record	526916	7490565	50
* <i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	Mexican Poppy	Mild	Opportunistic record	525902	7492533	150
			Opportunistic record	529230	7485476	-
			Opportunistic record	529322	7485344	1000+
			Opportunistic record	529533	7485266	-
			Opportunistic record	529574	7485138	250
			Opportunistic record^	530638	7486780	-
			Opportunistic record^	530502	7486697	-
* <i>Bidens bipinnata</i>	Beggars Ticks	TBA	BRL02	519866	7498860	-
			BRL10	523623	7497904	-
			BRL19	524803	7494764	-
* <i>Cenchrus ciliaris</i>	Buffel Grass	High	Opportunistic record	530067	7455373	-
			Opportunistic record	530067	7455373	-
			Opportunistic record	523485	7499441	10
			Opportunistic record	521233	7498109	3
			Opportunistic record	521735	7498105	-
			Opportunistic record	524829	7495791	-
			Opportunistic record	525476	7496220	-
			Opportunistic record	525498	7495592	-
			Opportunistic record	525611	7492828	-
			Opportunistic record	525669	7492697	-
			Opportunistic record	526230	7497872	-
			Opportunistic record	526941	7497493	-
			Opportunistic record	523146	7497725	-
			Opportunistic record	523146	7497774	-
			Opportunistic record	526056	7497822	Many
			Opportunistic record	520205	7498127	Many
			Opportunistic record	521780	7498104	Many
			Opportunistic record	525201	7496240	Many
			Opportunistic record	525241	7446747	-
			BRL02	519866	7498860	-
			BRL10	523623	7497904	-
			BRL15	525815	7497831	(90% foliar cover)
			BRL20	526386	7492370	(80% foliar cover)
			BRL27	527838	7490221	-
			Opportunistic record	526185	7492088	-
			Opportunistic record	529230	7485476	-
			Opportunistic record	529574	7485139	-
Opportunistic record^	530638	7486780	-			

Species	Common name	Weed Rating	Location - Quadrat #	Easting (mE)	Northing (mN)	Approx. # individuals
* <i>Cenchrus setiger</i>	Birdwood Grass	High	BRL10	523623	7497904	-
			Opportunistic record	525476	7496220	-
* <i>Datura leichhardtii</i>	Native Thornapple	Moderate	Opportunistic record	529322	7485344	2
* <i>Malvastrum americanum</i>	Spiked Malvastrum	Moderate	Opportunistic record	522847	7498779	-
			Opportunistic record	525537	7499365	-
			Opportunistic record	526230	7497872	-
			Opportunistic record	526941	7497493	-
			Opportunistic record	529093	7488230	-
			Opportunistic record	526695	7491315	7
			BRL02	519866	7498860	-
			BRL10	523623	7497904	-
			BRL15	525815	7497831	-
			BRL20	526386	7492370	-
			BRL23	526335	7493064	-
			BRL32	528906	7483730	-
			Opportunistic record^	530638	7486780	-
* <i>Melochia pyramidata</i>	Pyramid Flower	Mild	Opportunistic record	526961	7482301	-
* <i>Portulaca oleracea</i>	Purslane	Not rated	BRL19	524803	7494764	-
* <i>Setaria verticillata</i>	Whorled Pigeon Grass	Low	Opportunistic record	522847	7498799	-
			BRL10	523623	7497904	-
			BRL15	525815	7497831	-
* <i>Vachellia farnesiana</i>	Mimosa Bush	High	Opportunistic record	525201	7496240	3
			Opportunistic record	526056	7497822	1
			Opportunistic record	525329	7496808	-
			Opportunistic record	526695	7491315	-
			Opportunistic record	526976	7482252	3
			Opportunistic record	529151	7485389	-
			Opportunistic record	529878	7484490	Many