

# Hardey Resource Area and Gas Pipeline Vegetation and Flora Survey (Phase 2)

March 2012

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Prepared for  
API Management Pty Ltd



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## Abbreviations

Abbreviation	Definition
AMCI	American Metals and Coal International
API	Australian Premium Iron
ARRP Act	<i>Agriculture and Related Resources Protection Act 1976</i>
BOM	Bureau of Meteorology
DEC	Department of Environment and Conservation
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities
DRF	Declared Rare Flora
DAF	Department of Agriculture and Food
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EWSWA	Environmental Weed Strategy of Western Australia
GDA94	Geocentric Datum Australia 1994
GIS	Geographical Information System
HBP	Hardey Borrow Pits
HGP	Hardey Gas Pipeline
HRA	Hardey Resource Area
HRC	Hardey Rail Corridor
IBRA	Interim Biogeographic Regionalisation for Australia
IPPP	Invasive Plant Prioritisation Process
JV	Joint Venture
MGA50	Map Grid of Australia zone 50
NRMMC	National Resource Management Ministerial Council
NVIS	National Vegetation Information System
PEC	Priority Ecological Community
P3	Priority 3
TEC	Threatened Ecological Community
WC Act	<i>Wildlife Conservation Act 1950</i>
WPIOP	West Pilbara Iron Ore Project

## Executive Summary

Australian Premium Iron Management Pty Ltd (API) is managing the Australian Premium Iron Joint Venture, on behalf of equal joint venture partners Aquila Resources Ltd and American Metals and Coal International Inc. (AMCI). API holds a number of iron ore tenements in the western Pilbara area of Western Australia and is assessing the feasibility of mining the Hardey Bedded Iron Deposit. This resource is located approximately 50 km west-northwest of the township of Paraburdoo in the Pilbara, and covers approximately 1364 ha. Ore will be transported via a rail line that extends approximately 150 km west-northwest to the southern end of the West Pilbara Iron Ore Project Stage 1 (WPIOP Stage 1).

In 2008 and 2009, API commissioned Astron Environmental Services (Astron) to undertake a level 2 vegetation and flora assessment of the proposed Hardey Resource Area (HRA) including associated infrastructure zones, such as the accommodation village and administration area. In 2009, API requested the addition of the Hardey Gas Pipeline (HGP), an area of approximately 634 ha. Together these areas are referred to as the 'Survey Area' and total approximately 1998 ha. The aim of the surveys was to record and assess vegetation and flora values within the Survey Area. This report presents the results of the combined Phase 1 and Phase 2 surveys.

The survey was planned and implemented in accordance with the Environmental Protection Authority (EPA) Guidance Statement No 51 (EPA 2004) and EPA Position Statement No 3 (EPA 2002). The assessment included a desktop study to identify conservation significant vegetation and flora with the potential to occur in the Survey Area. Qualified botanists conducted the Phase 1 vegetation and flora survey over three field trips undertaken in April and August 2009 and October 2010. The Phase 2 surveys were undertaken in April, May and June 2011.

### Vegetation

Vegetation was described according to the density and cover of dominant species and mapped at the level of vegetation association (level 5 according to the National Vegetation Inventory System). Colour aerial photography at a 1: 10,000 scale was used to map vegetation association boundaries directly onto the maps whilst traversing the Survey Area by car and on foot. A total of 57 permanent 50 m x 50 m quadrats and 21 relevés were assessed from representative vegetation types.

Twenty four (24) vegetation associations were recorded within the Survey Area, including 17 in the HRA, and ten in the HGP (four vegetation associations were recorded in both the HRA and HGP). Vegetation condition ranged from Excellent to Poor in both the HRA and HGP. The general condition of the HGP was poorer than the HRA due to the combined effects of grazing and weed abundance. Further exploration drilling between Phase 1 and 2, increased ground disturbance due to track and drill pad establishment. Otherwise, the presence of weeds and some grazing were generally only evident in drainage areas in the HRA.

No Threatened Ecological Communities or Priority Ecological Communities were recorded in the Survey Area. Six of the vegetation associations recorded in the Survey Area are considered analogous with four 'at risk' ecosystems described by Kendrick (2001a and 2001b) in the Hamersley and/or Ashburton subregions: 'all major ephemeral water courses'; 'Hill-top floras of the Hamersley Range'; 'Valley floor Mulga'; and 'Mulga creekline community'. These vegetation associations (and the analogous associated 'at risk' ecosystems) account for approximately 10 % of the HRA and 3 % of the HGP.

Vegetation described and mapped in the Survey Area was considered to be analogous with four of the five vegetation associations (82, 160, 162 and 181) described and mapped by Beard (1975) in the

area. The analogous Beard (1975) vegetation associations were described by Kendrick (2001a and 2001b) as of Medium or High reservation priority in the Hamersley and/or Ashburton subregions. These analogous vegetation associations account for approximately 10 % of the HRA, and approximately 14 % of the HGP.

Results of the numerical analysis using presence/ absence data indicate that there was a significant difference in the overall floristic diversity recorded from sites between Phase 1 and Phase 2, reflective of the variation in rainfall across the survey years. Conversely, there was no significant difference between sampling technique (quadrats or relevés) in the analysis of Phase 2 data. A total of 30 numerical (floristic community) groups were associated with the Survey Area. Six of these groups are represented by only one site from the Survey Area. Both landform and land system were correlated with the numerical groups.

## Flora

A total of 295 vascular flora species from 47 families and 131 genera were recorded in the Survey Area. The dominant families were Fabaceae, Poaceae and Malvaceae. No Declared Rare Flora was recorded. One Priority Flora, the P3 species *Nicotiana umbratica*, was recorded in the Survey Area, in the HRA.

Mulga (*Acacia aptaneura*) was recorded in 22 quadrats and six relevés in the Survey Area. Mulga was recorded in 15 vegetation associations and was a dominant, or consistent associated species in eight of these. The majority of Mulga in the Survey Area occurred on hills and slopes, but it was also recorded on stony plains and along drainage tracts.

Seventeen (17) introduced flora species from 12 families were recorded, typically in association with floodplains and drainage lines. No Declared Plants were identified in the Survey Area. The most frequently occurring weed species was *\*Cenchrus ciliaris* (Buffel Grass).

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## 1 Introduction

### 1.1 Project Background

Australian Premium Iron Management Pty Ltd (API) is managing the API Joint Venture, on behalf of equal joint venture partners Aquila Resources Ltd and American Metals and Coal International Inc. (AMCI). API holds a number of iron ore tenements in the western Pilbara area of Western Australia and is assessing the feasibility of mining the Hardey Bedded Iron Deposit (Hardey resource).

The Hardey resource contains mineralisation in both the Brockman Iron Formation and the Marra Mamba Iron Formation and is located approximately 50 km west-northwest of the township of Paraburdoo in the Pilbara region (Figures 1 and 2). Ore will be transported via a rail line that extends approximately 150 km west-northwest to a location near the Catho Well deposit, the southern end of the West Pilbara Iron Ore Project Stage 1 (WPIOP Stage 1), which then extends to the proposed port site at Anketell Point.

During 2008 and 2009, API commissioned Astron Environmental Services (Astron) to undertake a level 2 vegetation and flora assessment of the proposed Hardey Resource Area (HRA) including adjacent areas proposed for infrastructure, such as an accommodation village and administration area. The total area of the HRA is approximately 1364 ha. In 2009, API requested that Astron also complete level 2 vegetation and flora surveys of the Hardey Gas Pipeline (HGP). The HGP is approximately 19 km in length and connects to the Goldfields Gas Transmission pipeline. Collectively these areas are referred to as the 'Survey Area' and cover a combined area of approximately 1998 ha.

Astron has also completed a level 2 vegetation and flora survey along the proposed Hardey Rail Corridor (HRC) and associated Hardey Borrow Pits (HBP). The results from this assessment are described in a separate report (Astron 2011a). Together, this Survey Area (including the HRA and HGP) and the HRC and HBP are referred to as the 'Project Area'.

### 1.2 Scope

A summary of the scope of work for the level 2 vegetation and flora assessment of the HRA and HGP is as follows:

#### **Desktop Study**

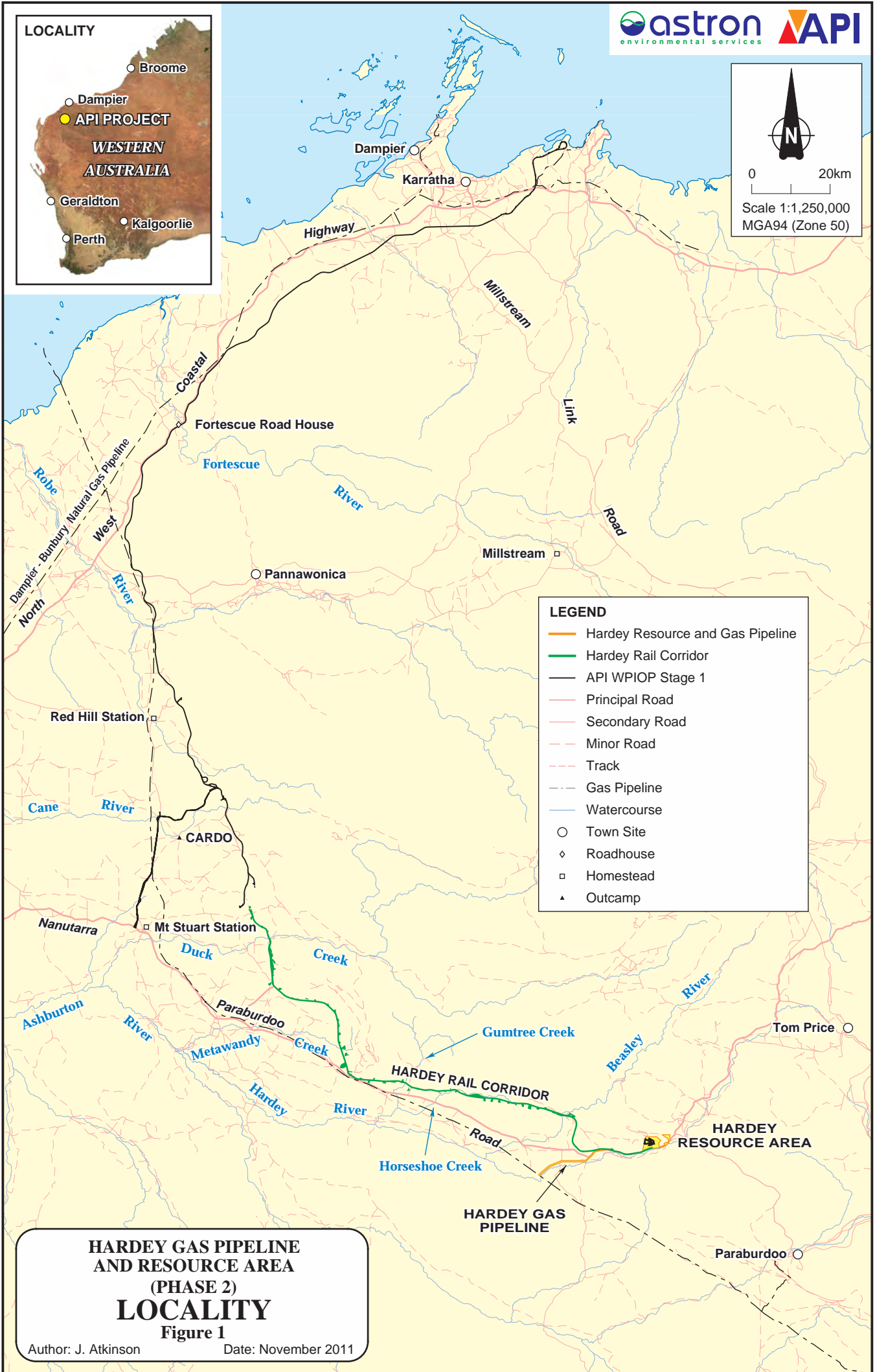
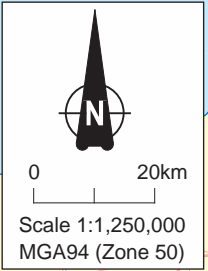
Conduct a desktop study that includes a search of relevant databases and a review of relevant literature to identify climatic and bioregional context, including but not limited to contextual information on flora (including significant flora), vegetation (including significant vegetation), landforms and water courses of relevance to the Survey Area.

#### **Vegetation and Flora Survey**

Undertake a comprehensive level 2 vegetation and flora survey. The survey is to include at a minimum, the installation of quadrats and sampling of vascular flora species from within quadrats; recording GPS location of Declared Rare, Priority and other significant flora recorded within quadrats or opportunistically; recording GPS locations of any Declared and noxious weeds recorded within quadrats or opportunistically; recording vegetation condition and evidence of disturbance. Vegetation description is to be consistent with level 5 (association) of the National Vegetation Inventory System (NVIS) vegetation classification system.

## **Data Processing and Reporting**

Following completion of the field surveys compile a comprehensive report including background information and results of the vegetation and flora survey. Background information is to include the results of the desktop study. Survey results are to include methodology of the desktop study and field surveys; descriptions of vegetation associations recorded in the Survey Area; results of floristic analysis; a list of all species, including introduced flora recorded in the Survey Area; details on the location, distribution and abundance of any significant flora or introduced flora species recorded; and assessment and map of vegetation condition within the Survey Area. Any limitations of the survey, seasonal or otherwise, are to be outlined.

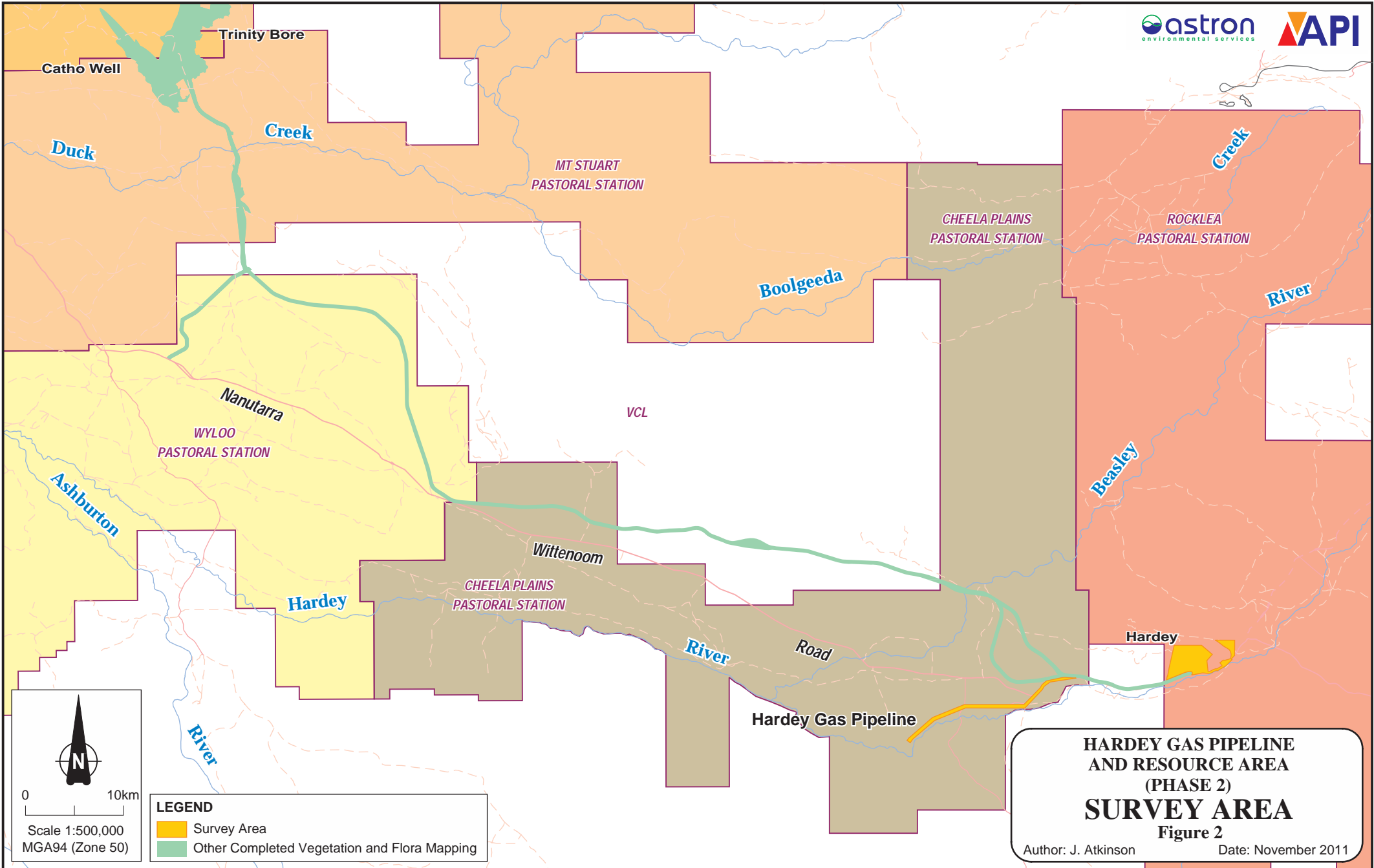


**LEGEND**

- Hardey Resource and Gas Pipeline
- Hardey Rail Corridor
- API WPIOP Stage 1
- Principal Road
- Secondary Road
- Minor Road
- Track
- - - Gas Pipeline
- Watercourse
- Town Site
- ◇ Roadhouse
- Homestead
- ▲ Outcamp

**HARDEY GAS PIPELINE AND RESOURCE AREA (PHASE 2) LOCALITY**  
Figure 1  
Author: J. Atkinson Date: November 2011

Author: J. Atkinson ~ Drawn: CAD Resources ~ Tel 9246 3242 ~ URL www.cadresources.com.au ~ Date Nov 2011 ~ A4 ~ CAD Ref g1505\_Ast\_V\_HRs2\_Loc\_01.dgn



**HARDEY GAS PIPELINE  
AND RESOURCE AREA  
(PHASE 2)  
SURVEY AREA  
Figure 2**  
Author: J. Atkinson      Date: November 2011

## 1.3 Environmental Context

### 1.3.1 Climate

The climate of the Pilbara region of Western Australia is classified as arid tropical with two distinct seasons: a hot wet summer (October – April) and a mild dry winter (May – September). The region is characterised by highly variable, but generally low rainfall, and high year-round temperatures.

The passage of high pressure systems to the south during winter, produce easterly winds and some precipitation over the inland Pilbara (Van Vreeswyk *et al.* 2004). During the summer, heat generated low pressure systems dominate the inland Pilbara region generating intermittent thunder storms.

Tropical cyclones develop over warm tropical waters between December and March. These often track south west along the Pilbara coast, or turn inland across the Pilbara bringing destructive winds, widespread rain and flooding (Payne and Tille 1992).

Based on climatic data from Paraburdoo Airport (weather station 007185), the nearest weather station with long term rainfall data located 50 km west-northwest of the eastern extent of the Survey Area, the mean annual rainfall is 283 mm, but seasonal and annual variability is very high (BOM 2011). The majority of rain falls between December and April (Figure 3). The mean maximum temperatures at Paraburdoo are above 30°C for much of the year and exceed 40°C during December and January. Mean maximum temperatures drop below 30°C during May, June and July (BOM 2011) (Figure 3).

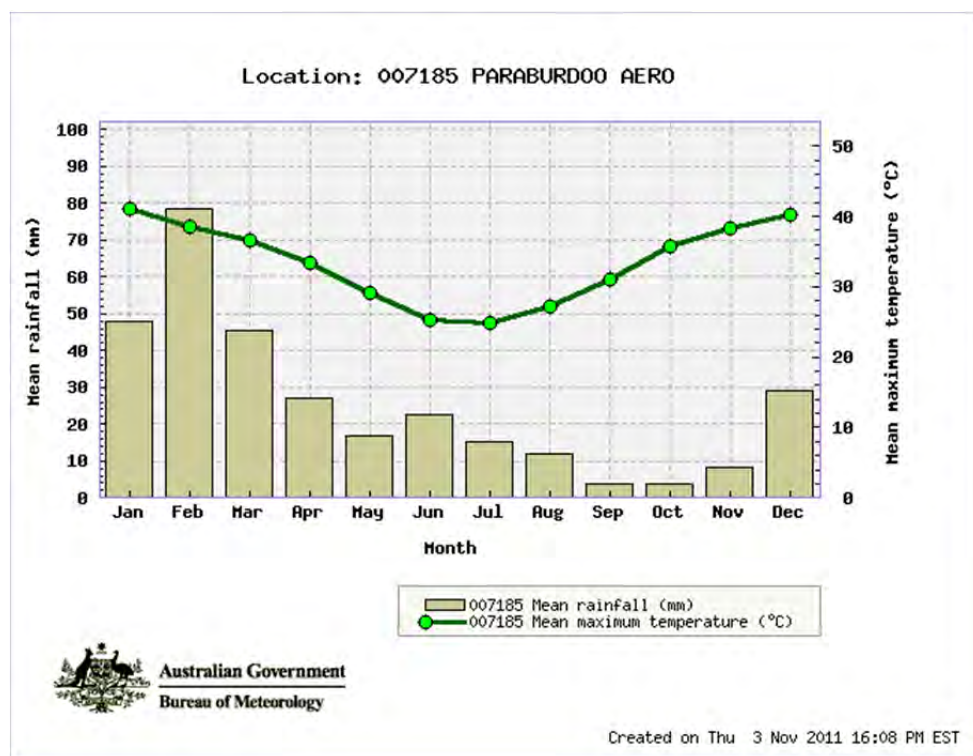


Figure 3: Climate Data for Paraburdoo Airport (BOM, 2011).

### 1.3.2 Geology Soils and Landforms

The HRA occurs on the Hardey Bedded Iron Deposit and is located within the fold closure of the Hardey Syncline. Exposed geology and drilling results identify a structurally complex environment with local folding, faulting and shear displacement disrupting continuous exposure of stratigraphical members. Exposed and intercepted lithological units within the Hardey Syncline consist of Hamersley Group bedded iron formations and sediments, including the Whaleback Shale and Dales Gorge Member of the Brockman Iron Formation, and the Marra Mamba Formation. The syncline is enveloped by Fortescue Group Jeerinah Formation basaltic volcanics. Quaternary alluvial cover extends along the length of the Hardey River (pers. comm. James Moran 16 February 2011).

The HGP occurs on the Ashburton Basin, a belt of Proterozoic meta-sedimentary and meta-volcanic rocks of the Wyloo group that flank the southern and western edges of the Pilbara craton. The floor of the Ashburton Valley rises from 80 m in the northwest to 300 m in the southeast (Thorne and Seymour 1991).

Geological formations as they relate to land systems are provided in detail in Section 1.3.5.

The HRA occurs in the Fortescue Province of the Western Australia Soil Landscape Zones. The Fortescue Province is typified by rocky hills and stony plains (Tille 2006). The HRA is associated with one soil landscape zone, Hamersley Plateaux. The HGP occurs in the Ashburton Province, characterised by hills and ranges, with stony plains and hardpan wash plains, on the sedimentary and granitic rocks of the Capricorn Orogen. The HGP is associated with one soil landscape zone, the Ashburton Valley. The soils and landforms typical of the Hamersley Plateaux and Ashburton Valley are described in Table 1.

**Table 1: Soil landscapes of the Survey Area (Tille 2006).**

Soil Landscape Province	Soil Landscape Zone Code	Soil Landscape Zone Description
Fortescue	285 Hamersley Plateaux	Hills and dissected plateaux (with some stony plains and hardpan wash plains) on sedimentary and volcanic rocks of the Hamersley Basin (Ophthalmia Fold Belt). Stony soils with Red shallow loams and some Red/brown non-cracking clays and Red loamy earths. Located in the Pilbara between Pannawonica, Newman and Paraburadoo.
Ashburton	298 Ashburton Valley	Hills and ranges (with some floodplains and stony plains) on sandstone, shale and conglomerate of the Ashburton Basin. Stony soils with Red loamy earths and Red shallow loams. Located in the southern Pilbara along the Ashburton River between Nanutarra, Paraburadoo and Turee Creek Station.



### 1.3.3 Surface Water

The Survey Area is associated with the Ashburton River catchment. The Hardey River is a major tributary of the Ashburton River and occurs to the immediate south of the HRA (Figure 1). Tributaries of the Hardey River occur within the HRA and the HGP alignment is within the Hardey River floodplain. The headwaters of the Hardey River arise near Tom Price and the river runs almost parallel with the Nanutarra-Paraburdoo Road for approximately 253 km before flowing into the Ashburton River (Bonzle 2011).

The Survey Area does not include, and is not in close proximity to, any wetlands listed as Ramsar sites or listed on the Directory of Important Wetlands in Australia (Environment Australia 2001). The nearest Directory wetland is Kookhabinna Gorge, located 50 km to the south of the Survey Area, which is not linked by tributary to the Survey Area.

### 1.3.4 Vegetation and Flora

Beard (1975) mapped vegetation across the Pilbara region at a scale of 1:1,000,000. The HRA is located in the Fortescue Botanical District, while the HGP occurs within the Ashburton Botanical District. The Beard vegetation mapping associated with the Survey Area is presented in Appendix A.

The Fortescue Botanical District is characterised by spinifex (*Triodia* spp.) hummock grasslands. Towards the south of the region, there is a transition from the grasslands that dominate in the north to Mulga (recently revised to include a number of different species) woodlands (Beard 1990). One Fortescue physiographic unit is mapped within the Survey Area, the Hamersley Plateau. This physiographic unit and the Beard vegetation associations described within it are described in Table 2.

The Ashburton Botanical District is dominated by Mulga, often with Snakewood (*Acacia xiphophylla*) and other *Acacia* spp. occurring as scrub on hills and as low woodlands on the plains. *Eremophila* and *Senna* spp. may also occur (Beard 1990). One Ashburton physiographic unit is mapped within the Survey Area, the Ashburton Valley. This physiographic unit and the Beard vegetation associations described within it are presented in Table 2.

Table 2: Beard (1975) Vegetation Associations for the Survey Area.

Beard Physiographic Unit (Botanical District)	Beard Vegetation Association	Total Area of Beard Vegetation Association (ha)	Area within Hardey Gas Pipeline (ha)	Area within Hardey Resource Area (ha)	Total Area within Survey Area (ha)	Proportion within Survey Area (%)	Vegetation Description
Ashburton Valley (Ashburton)	160	68594.0	340.7	0	340.7	0.5	Shrublands; snakewood and <i>A. victoriae</i> scrub.
	181	198074.1	228.3	0	228.3	0.1	Shrublands; Mulga and snakewood scrub.
Hamersley Plateau (Fortescue)	82	2169996.6	22.3	1087.5	1109.8	0.1	Hummock grasslands, low tree steppe; snappy gum ( <i>Eucalyptus leucophloia</i> ) over <i>Triodia wiseana</i> .
	162	547109.7	42.0	276.5	318.5	0.1	Shrublands; snakewood scrub.
	567	776997.6	0.5	0.3	0.8	<0.1	Hummock grasslands, shrub steppe; Mulga and kanji over soft spinifex and <i>Triodia basedowii</i> .

### 1.3.5 Land Systems

Land systems mapping of the Ashburton River Catchment was published in 1988 by the Western Australian Department of Agriculture and Food (DAF) and covered approximately 93,600 km<sup>2</sup>. The land systems were mapped and described at a scale of 1:250,000 using climate, geomorphology, soils and pasture lands data (Payne *et al.* 1988). Sixty three (63) land systems were described for the Ashburton River Catchment area, of which six are associated with the Survey Area (Table 3 and Appendix A). The majority of the HRA is located in the Rocklea land system, while the majority of the HGP is located in the Cheela land system. A summary of these land systems in relation to geology, soils, landform and vegetation is presented in Table 4.

Table 3: Distribution of Land Systems within the Survey Area and the Ashburton River Catchment Area (Payne *et al.* 1988).

Land system	Total Area in Ashburton River Catchment (ha)	Area within HRA (ha)	Proportion within HRA (%)	Area within HGP (ha)	Proportion within HGP (%)	Total Area within Survey Area (ha)	Proportion within Survey Area (%)
Cheela	20 400	0	0	446.4	2.2	446.4	2.2
Capricorn	334 100	0	0	52.1	<0.1	52.1	<0.1
Newman	652 900	399.3	0.1	0	0	399.3	0.1
Paraburdoo	76 100	0	0	40.4	0.1	40.4	0.1
River	82 900	66.0	0.1	94.8	0.1	160.7	0.2
Rocklea	809 600	899.1	0.1	0	0	899.1	0.1

Table 4: Summary of Ashburton River Catchment Land Systems (Payne *et al.* 1988) located within the Survey Area.

Land System	Landforms	Soils	Vegetation
Capricorn land system (Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex).	Ridges, hills and upper slopes.	Stony soils.	Hummock grasslands of <i>Triodia wiseana</i> , <i>T. brizoides</i> (hard spinifex) or <i>T. pungens</i> (soft spinifex) with scattered <i>Acacia inaequilatera</i> and other <i>Acacia</i> spp. and <i>Grevillea wickhamii</i> .
	Lower footslopes.	Red shallow loams.	Hummock grasslands of <i>Triodia wiseana</i> , <i>T. brizoides</i> (hard spinifex) or <i>T. pungens</i> (soft spinifex) with scattered <i>Acacia inaequilatera</i> and other <i>Acacia</i> spp. and <i>Grevillea wickhamii</i> .
	Stony plains.	Red shallow sands and red shallow loams.	Hummock grasslands of <i>T. wiseana</i> or <i>T. pungens</i> with scattered <i>Acacia</i> spp. shrubs.
	Narrow drainage floors and channels.	River bed soils.	Scattered tall shrublands or low woodlands with <i>Acacia</i> spp., <i>Corymbia hamersleyana</i> , numerous other shrubs and soft spinifex.
Cheela land system (Degraded alluvial plains with very sparse shrublands).	Low hills.	Rocky outcrop.	Sparse low shrubland of stunted Mulga and <i>Senna</i> spp. with forbs and sparse grasses.
	Sandy outwash plains.	Coarse reddish brown sands or loamy sands.	Low shrubland with <i>Eremophila leucophylla</i> , <i>Rhagodia eremaea</i> and <i>Senna</i> spp. and perennial and annual grasses and numerous forbs.
	Alluvial plains with channelled tracts.	Dark red or reddish brown seasonal cracking clay soils.	Degraded sparse low shrubland mainly <i>Senna oligophylla</i> with sparse perennial grasses <i>Eragrostis setifolia</i> , <i>E. xerophila</i> .
	Alluvial plains.	Reddish brown sandy to clayey loams.	Degraded shrublands of variable density; bands of dense shrublands of <i>Acacia victoriae</i> and other <i>Acacia</i> spp. with numerous low shrub, forbs and grasses, interspersed with larger areas of almost bare surfaces supporting numerous forbs and annual grasses only after rain.
	Internal drainage plains.	Dark red or reddish brown seasonal cracking clay soils.	Mostly open tussock grasslands of <i>Eragrostis setifolia</i> , <i>E. xerophila</i> with scattered low shrubs, some areas of tall shrublands of <i>Acacia victoriae</i> with grassy understorey.
	Calcrete platforms.	Dark red loams of variable depth on calcrete.	Low woodlands of <i>Eucalyptus dichromophloia</i> with numerous tall and low shrubs and grassy ground storey.

Land System	Landforms	Soils	Vegetation
Newman land system (Rugged jaspilite plateau, ridges and mountains).	Plateaux ridges mountains and hills	Stony soils and red shallow loams with some red shallow sands.	Hummock grassland of mixed hard <i>Triodia</i> with very scattered / scattered shrubs and trees including <i>Acacia</i> and <i>Senna</i> spp., <i>G. wickhamii</i> , and mixed <i>Eucalyptus</i> spp. Occasionally soft hummock grassland.
	Lower slopes.	Stony soils on upper margins with red loamy earths on lower margins.	Similar to above.
	Stony plains.	Stony soils with red shallow loams and some red loamy earths.	Hummock grassland of hard <i>Triodia</i> with isolated / very scattered shrubs of <i>Acacia</i> and <i>Senna</i> spp. and occasional <i>Eucalyptus</i> trees. Occasionally soft <i>Triodia</i> hummock grassland.
	Narrow drainage floors with channels.	Red shallow loams and red loamy earths. Channels with river soils.	Smaller floors support <i>Triodia</i> hummock grassland with very scattered shrubs. Larger floors and channels support tall <i>Acacia</i> spp. shrublands / woodlands and <i>E. victrix</i> with tussock or hummock grass understorey.
Paraburdoo land system (Basalt derived stony gilgai plains and stony plains supporting snakewood and Mulga shrublands with spinifex, chenopods and tussock grasses).	Low basalt hills and ridges.	Stony soils.	Low shrublands with <i>Corchorus walcottii</i> (grey Corchorus), <i>Ptilotus obovatus</i> (cotton bush), <i>Senna</i> spp. (cassias), and sparse overstorey of <i>Acacia</i> spp. Also hummock grasslands of <i>Triodia wiseana</i> (hard spinifex) and very scattered shrubs.
	Upper interfluves and slopes.	Shallow red/brown non-cracking clays and red shallow loams.	Scattered tall shrublands of <i>Acacia aneura</i> (Mulga) or <i>A. xiphophylla</i> (snakewood) with numerous low shrubs including <i>Senna</i> spp. and <i>Maireana</i> spp. (bluebushes). Also hummock grasslands of <i>Triodia wiseana</i> with very scattered acacia shrubs.
	Groves.	Red deep loamy duplex soils and self-mulching cracking clays.	Moderately close to close tall shrublands/woodlands of <i>Acacia aneura</i> with sparse undershrubs and tussock grasses such as <i>Chrysopogon fallax</i> (ribbon grass).
	Gilgai plains.	Deep red/brown non-cracking clays and self-mulching cracking clays.	Tussock grasslands with <i>Eragrostis xerophila</i> (Roebourne Plains grass) and other perennial grasses and isolated or very scattered shrubs or scattered tall shrublands of <i>Acacia xiphophylla</i> with tussock grass understorey.
	Drainage zones.	Deep red/brown non-cracking clays and red loamy earths.	Scattered tall shrublands of <i>Acacia aneura</i> , <i>A. victoriae</i> (prickly acacia) with variable understoreys including <i>Senna</i> and <i>Maireana</i> spp. with tussock and / or hummock grasses. Also hummock grasslands of <i>Triodia</i> spp. (hard and soft spinifex) with very scattered shrubs.

Land System	Landforms	Soils	Vegetation
	Braided creeklines and channels.	River bed soils.	Moderately close tall shrublands/woodlands of <i>Acacia citrinoviridis</i> (black Mulga) and other <i>Acacia</i> spp., <i>E. camaldulensis</i> (river red gum) with variable low shrubs and tussock grasses.
River land system (Active flood plains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft Spinifex grasslands).	Flood plains.	Alluvial soils, dark red or dark reddish brown, textures from sand to light clay.	Tall shrublands, moderately dense <i>Acacia victoriae</i> , <i>A. sclerosperma</i> , <i>A. citrinoviridis</i> sparse overstorey <i>Eucalyptus coolabah</i> , variable low shrubs including <i>Senna</i> spp., <i>Atriplex bunburyana</i> , <i>Maireana pyramidata</i> , also * <i>Cenchrus ciliaris</i> ground storey.
	Sandy margins.	Dark red or dark reddish brown sands or sandy surfaced soils.	Shrublands depending on soil depth, <i>Acacia victoriae</i> and other <i>Acacia</i> spp., variable understoreys such as <i>Triodia pungens</i> or <i>Senna</i> spp., forbs and annual grass.
	Stony plains.	Stony seasonal cracking dark red clay soils, also loamy soils of variable depth with stony surface pavement.	Tall open shrubland with <i>Acacia xiphophylla</i> , <i>A. victoriae</i> sparse low shrubs, including <i>Enchylaena tomentosa</i> , <i>Rhagodia eremaea</i> , <i>Senna</i> spp., forbs and annual grasses.
	Channels and banks.	Channels- no soils, bedloads of sand, gravel, pebbles and cobbles. Banks- dark reddish browns sands and silty loams.	Channels- no vegetation. Banks-woodland or dense tall shrubland fringing communities including <i>Eucalyptus coolabah</i> , <i>E. camaldulensis</i> , <i>Acacia citrinoviridis</i> , <i>A. sclerosperma</i> , numerous low shrubs, forbs and annual grasses.
Rocklea land system (Basalt hills, plateaus, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands).	Hills, ridges, plateaus and upper slopes.	Stony soils, red shallow loams and calcareous shallow loams.	Hummock grassland of hard or soft <i>Triodia</i> spp. with isolated to very scattered shrubs such as <i>Acacia inaequilatera</i> and <i>Senna</i> spp.
	Lower slopes.	Red shallow loams and red shallow sandy duplex soils.	Hummock grassland of hard or soft <i>Triodia</i> spp. with isolated to very scattered shrubs such as <i>Acacia inaequilatera</i> and <i>Senna</i> spp.
	Stony plains and interfluves.	Calcareous shallow loams, red sandy earths and shallow red/brown non-cracking clays	Hummock grasslands of hard or soft <i>Triodia</i> spp. with isolated to very scattered shrubs such as <i>A. inaequilatera</i> . Occasionally grassy shrublands such as <i>Acacia</i> , <i>Senna</i> and <i>Eremophila</i> spp.
	Gilgai plains.	Self-mulching cracking clays.	Tussock grasslands with perennial grasses such as <i>Astrelba pectinata</i> and <i>Eragrostis xerophila</i> .

Land System	Landforms	Soils	Vegetation
	Drainage floors and channels.	Red loamy earths with red shallow sandy duplex soils and red/brown non-cracking clays.	Scattered to moderately closed tall shrublands or woodlands of <i>Acacia</i> and <i>Eucalyptus</i> spp. with mixed understorey shrubs and hummock grass or tussock grass understorey.



### 1.3.6 Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation for Australia (IBRA) (IBRA version 6.1) divides the Australian continent into 85 bioregions and 403 subregions (Thackway and Cresswell 1995). IBRA regions represent a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna. Specialist ecological knowledge, combined with appropriate regional and continental scale biophysical datasets were interpreted to describe these regions (Thackway and Cresswell 1995). Information about each subregion is used to help determine which ecosystems are adequately protected in the conservation estate. The Survey Area occurs in the Pilbara Bioregion, of which approximately 5-10 % is represented in the national reserve system (DSEWPC 2010a).

IBRA bioregions are further divided into subregions. The biodiversity of Western Australia's 53 subregions was documented as part of a national audit to provide priorities for conservation action (DEC 2002). The Survey Area is associated with the Hamersley (PIL3) subregion of the Pilbara Bioregion and the Ashburton (GAS3) subregion of the Gascoyne Bioregion. The total area of each subregion associated with the Survey Area is presented in Table 5. The subregions are described as:

- Hamersley PIL3- dissected bold plateaux and ranges of flat lying or moderately folded sandstone and quartzite with vegetation described as Mulga (previously *Acacia aneura* but now including a number of species) low woodland over tussock grasses occurring on fine textured soils in valley floors, with scattered Snappy gum (*Eucalyptus leucophloia*) over *Triodia brizoides* on skeletal soils of the ranges (Kendrick 2001a).
- Ashburton GAS1- Mountainous range country dissected by extensive flat valleys associated with the Ashburton River catchment of the Ashburton Basin, and the north-western part of the Bangemall Basin. Mulga (previously *Acacia aneura* but now including a number of species) / snakewood (*Acacia xiphophylla*) low woodlands occur on shallow earthy loams over hardpan on the plains, with Mulga scrub and *Eremophila* shrublands on the shallow stony loams of the ranges. Low mixed shrublands on hills with *Triodia* dominating in other areas (Kendrick 2001b)

Table 5: IBRA subregions associated with the Survey Area.

IBRA subregion (Bioregion)	Area within Hardey Gas Pipeline (ha)	Proportion of Gas Pipeline (%)	Area within Hardey Resource Area (ha)	Proportion of Resource Area (%)	Total in Survey Area (ha)	Proportion of Survey Area (%)
Ashburton (Gascoyne)	570.1	90	0	0	570.1	28.5
Hamersley (Pilbara)	63.6	10	1364.3	100	1427.9	71.5

### 1.3.7 Western Australian Biodiversity

State ecologists assessed the reservation status and priority for acquisition of vegetation associations mapped by Hopkins *et al.* (1996) and Shepherd *et al.* (2002) at the IBRA sub regional level. Vegetation associations were identified as being of Low, Medium or High priority for reservation in the conservation estate, depending on the proportion reserved at the time of publishing, and according to the perceived the threats and values (DEC 2002). Approximately 5-10 % of both the Hamersley and Ashburton subregions are represented in the national reserve system (DSEWPC 2010a).

Some ecosystems within each IBRA subregion were also considered ‘at risk’. These communities are typically threatened by cattle, feral herbivores and fire, and exhibit a decline in condition (DEC 2002). Some of the ecosystems previously listed as ‘at risk’ and formally gazetted as Threatened Ecological Communities under the *Wildlife Conservation Act 1950* are not declared threatened under WA legislation.

In 2003, the Pilbara region was identified by the Commonwealth Government as one of 15 regions in Australia worthy of priority conservation funding because of its high biodiversity values and high levels of threat to those values. Its listing as an Australian Biodiversity Hotspot, gives recognition to the high level of species diversity and number of species found nowhere else (endemic), the presence of a number of threatened species and the presence of fire-sensitive species and communities. In addition to wildfire, pressures from over-grazing, introduced species and general land degradation were identified as significant threats to native biota in the region (DSEWPC 2009).

### 1.3.8 Vegetation and Flora Conservation Categories

Commonwealth and Western Australian regulatory agencies maintain databases of the locations and conservation status of significant ecological communities and flora species in Western Australia.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage matters of national environmental significance including listed ecological communities and flora species. Listed ecological communities and flora species are allocated conservation categories, which are outlined in Appendices B and C, respectively.

A Threatened Ecological Community (TEC) is an ecological community that has been identified by the Western Australian Minister for the Environment as being subject to processes that threaten to destroy or significantly modify it across much of its range. TECs are listed as one of four categories, outlined in Appendix B. Not all state listed TECs are listed on the Commonwealth register. The DEC also maintains a list of Priority Ecological Communities (PECs). PECs are assigned one of four priority rankings according to the criteria outlined in Appendix B. Unlike TECs, PECs are not formally recognised by the Minister for Environment.

Under Western Australian legislation, all native flora are protected and it is an offence to ‘take’ native flora. To ‘take’ includes the removal of seeds or injuring plants. The *Wildlife Conservation Act 1950* (WC Act) also provides for native plant species to be specially protected because they are under identifiable threat of extinction, are rare, or otherwise in need of special protection. Such specially protected flora is considered under the WC Act to be threatened and is referred to as Declared Rare Flora (DRF).

Due to the diversity of Western Australia’s flora, many species are known from only a few collections or locations, but have not been adequately surveyed. Such flora may be rare or threatened, but cannot be considered for declaration as threatened flora until adequate surveys have been undertaken. These flora species are included on a supplementary conservation list called the Priority Flora List. Three categories of Priority Flora cover these poorly known species. A fourth category of Priority Flora includes species that have been adequately surveyed and are considered to be rare but not currently threatened and a fifth category of Priority Flora includes conservation dependent species. Western Australian flora conservation categories are described in Appendix C.

### 1.3.9 Introduced Flora Categories

The Australian Weed Strategy (NRMMC 2006) identifies ‘Weeds of National Significance’. Weeds of National Significance are invasive species with the potential to impact primary industry and / or environmental and social values.

The management of introduced flora (weeds) in Western Australia is primarily regulated through the provisions of the *Agriculture and Related Resources Protection Act 1976* (ARRP Act), and the *Biosecurity and Agriculture Management Act 2007*. A list of Declared Plants has been gazetted under the ARRP Act. Declared Plants are allocated one of five priority ratings that define the required level of management (DAF 2011). These are detailed in Appendix D.

The Environmental Weed Strategy for Western Australia (EWSWA) ranked all weed species in Western Australia according to the three criteria of invasiveness (ability to invade bushland or waterways); distribution (current and potential distribution); and environmental impacts (ability to change structure, composition and function of ecosystems). This resulted in a 4 level ranking system of High, Moderate, Mild and Low (DEC 1999) (Appendix D).

The Invasive Plant Prioritization Process (IPPP) developed from the EWSWA to provide an integrated approach to management of introduced plants in Western Australia. One of the main aims is to consider both a ‘species led’ and a ‘site led’ or asset based approach to control the threat of environmental weeds in Western Australia (DEC 2011b). The IPPP scores weeds based on a number of criteria, including but not limited to potential and current distribution, abundance, ecological impact, invasiveness, feasibility of control, and general trend. Details of the IPPP scoring system used to prioritize weed status are presented in Appendix D.

### 1.3.10 Land Use

The HRA occurs on the Rocklea pastoral lease, while the HGP also occurs on the Cheela Plains pastoral lease (Figure 2). Land in this area is used for low intensity cattle grazing and is administered by the *Land Administration Act 1997*.

The Survey Area is not within or adjacent to any conservation reserves. The closest reserve, Karijini National Park, is approximately 60 km east of the Survey Area.

## 2 Methodology

### 2.1 Desktop Assessment

#### 2.1.1 Database Searches

Database searches were conducted to identify listed ecological communities and listed flora species within or in close proximity to the Survey Area. Search details are summarised in Table 6.

Table 6: Details of database searches undertaken.

Database Name	Date Search Results Received	Search Focus	Search Area
Protected Matters Search Tool (DSEWPC)	2 November 2011	Matters of National Environmental Significance including both listed ecological communities and flora species.	Based on an area within a 10 km radius of the coordinates 22°57'10" south and 117°18'31" east (GDA94).
DEC Threatened Ecological Communities and Priority Ecological Communities database	19 January 2011	Listed Threatened and Priority ecological communities.	Based on an area within a 50 km radius of the coordinates 22°57'10" south and 117°18'31" east (GDA94).
DEC Florabase	22 December 2010	Declared Rare (DRF) and Priority Flora species	
Western Australian Herbarium flora			

As the results provided in the database searches are dynamic (due to additional information being contributed, or changes to ecological community and flora rankings) the results of searches are regularly reviewed and updated by Astron based on current information available from the DEC.

#### 2.1.2 Literature Review

No other major resource projects are known to have occurred in the immediate vicinity of the Survey Area. A literature review assessing the vegetation and flora values of a selection of other resource projects in the Hamersley subregion of the Pilbara was conducted, and included the following reports:

- Astron Environmental Services (Astron), 2010a. *West Pilbara Iron Ore Project, Reconciliation of Vegetation Descriptions and Associated Vegetation Mapping*. Consultants report prepared for API Management Pty Ltd. (This report is a collation of the vegetation and flora data collected by consultants for the WPIOP).
- Biota Environmental Sciences (Biota). 2005. *Vegetation and Flora Survey of Mesa A and Mesa G, near Pannawonica*. Consultants report prepared for Robe River Iron Associates.
- Biota Environmental Sciences (Biota). 2008. *Marandoo Mine Phase 2 Project Vegetation and Flora Survey*. Consultants report prepared for Rio Tinto.
- Mattiske Consulting Pty Ltd (Mattiske). 2008. *Flora and vegetation on the Hope Downs 4 Mine and Village/ Camp Area*. Consultants report prepared for Pilbara Iron.

- Western Botanical. 2010. *Flora and Vegetation of the Proposed Mine & Associated Infrastructure Areas West Pilbara Iron Ore Project*. Consultants Report Prepared for API Pty Ltd.

To determine whether any of the ecosystems listed as being ‘at risk’ or of reservation priority occurred within the Survey Area, the dominant species and structure of listed ecosystems were compared to those described for the vegetation associations recorded in the Survey Area.

### 2.1.3 Seasonal Conditions

The presence and condition of flora species is influenced by recent rainfall. A comparison was made between rainfall recorded during the twelve months prior to the field survey and the annual averages for the local area to determine adequacy of season for botanical surveys.

The rainfall records from Paraburdoo Airport were used to monitor rainfall in the region. Cheela Plains, Wyloo, and Mount Stuart Pastoral Stations are nearest to the Survey Area and also record rainfall but all had incomplete records between 2008 and 2011. Available records from these stations were reviewed where possible.

## 2.2 Field Survey

The Phase 1 and Phase 2 field surveys were undertaken as far as practicable in accordance with the requirements for a level 2 assessment outlined in the *Environmental Protection Authority’s (EPA) Position Statement 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (2002)* and *EPA Guidance Statement 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (2004)*.

Three qualified Astron personnel were involved in conducting a reconnaissance trip prior to the Phase 1 vegetation and flora surveys (15 - 24 April 2009). The aim of the reconnaissance trip was to assess the Survey Area in terms of broad vegetation groups, floristic diversity, landforms and access, and to identify target areas of interest and potential remote camp locations.

Six Astron personnel were involved in conducting the Phase 1 vegetation and flora survey of the HRA and HGP over three field visits (Table 7). The Phase 2 surveys were completed by 11 personnel over four field visits. Qualified and experienced botanists Janelle Atkinson, Britta Mathews, Alice Bott, Brian Vincent and Natalie Cadd led field teams.

**Table 7: HRA and HGP Phase 1 and Phase 2 field survey trip dates and personnel.**

Trip Number	Trip Dates	Personnel
1	15 - 24 April 2009	Janelle Atkinson, Brian Vincent, Luke Wheat, Megan Stalker
2	23 August – 1 September 2010	Britta Mathews, Brian Vincent, Louise Kitscha and Natalie Cadd
3	15 - 21 October 2010	Janelle Atkinson and Britta Mathews
4	17 – 21 April 2011	Janelle Atkinson, Alice Bott, Travis Doehring, David Williams
5	2 – 13 May 2011	Janelle Atkinson, Brian Vincent, Megan Stalker, David Williams
6	20 - 31 May 2011	Janelle Atkinson, Brian Vincent, Britta Mathews, Travis Doehring, Jesse Kalic, Clemency Wilson
7	11 – 17 June 2011	Janelle Atkinson, Natalie Cadd, Natalie Krawczyk, Travis Doehring

The Survey Area was accessed by vehicle and traversed on foot to access sample sites and other areas of interest. An Arcpad Geographic Information System (GIS) with the Survey Area uploaded and a hard copy of colour aerial photography on A3 maps at a scale of 1: 10,000 were used to locate the Survey Area on the ground and to assist in navigation and delineation of vegetation boundaries.

A total of 57 permanent 50 m x 50 m or 2500 m<sup>2</sup> (for creek line or irregularly shaped vegetation areas) quadrats and 21 relevés (unbound sampling site of a homogenous vegetation unit) were sampled from representative vegetation associations throughout the Survey Area. The breakdown of these survey sites according to Survey Area is presented in Table 8.

**Table 8: Quadrats and relevés sampled during this survey.**

Site	Quadrats	Relevés
Resource Area (HRA)	53	15
Gas Pipeline (HGP)	4	6

The northwest, southwest, northeast and southeast corners of each quadrat were aligned with the aid of an optical square and marked with galvanised steel fence droppers.

The following information was collected at each quadrat and relevé:

- **Location** – coordinates (one coordinate taken for a relevé) measured using a handheld GPS (MGA50, GDA94);
- **Recorder and date**—a list of the personnel involved in sampling that location and the survey date;
- **Species** – the vascular plant species present. Species unable to be identified in the field were collected for identification at the Western Australian Herbarium and by specialist taxonomists;
- **Weeds**- coordinates and density of any introduced flora ;
- **Percent Foliar Cover** – the percentage cover was estimated for each species recorded;
- **Vegetation description** – vegetation was described according to Aplin's (1979) modification of the vegetation classification system of Specht (1970) based on height and percentage foliar cover (Appendix E). Vegetation was described as three strata as specified under National Vegetation Inventory System (NVIS) level 5 (DSEWPC, 2003).
- **Vegetation condition** – condition of the vegetation was assessed according to the Vegetation Condition Classification of Keighery (1994) and Kaesehagen (1995) (Appendix E);
- **Habitat** – a broad description of the surrounding landscape based on landform, topography and soil;
- **Disturbances** – records of any obvious disturbances such as fire, tracks;
- **Photographs** – a photograph was taken of each quadrat and relevé from the northwest corner facing southeast; and
- **Voucher specimens** – where good vegetative material was present, plant specimens were collected for vouchering purposes.

### 2.2.1 Vegetation Description Mapping

Boundaries between discrete vegetation groups (vegetation association boundaries) were marked onto 1:10,000 colour aerial photographs in the field. For mapping purposes, differences in vegetation were determined by comparison of structural components (i.e. height and density of species). Vegetation associations were described according to the NVIS level 5: association level, which categorises vegetation based on dominant growth form, cover, height and three dominant species for upper, mid and ground strata (DSEWPC 2003). Over 50 vegetation mapping notes from on-ground and aerial surveys were collected and used to assist in the delineation of vegetation associations in areas where quadrats and relevés were not sampled. Where possible, the vegetation association descriptions and codes used for the WPIOP Stage 1 (Astron 2010a) were adopted to describe vegetation in the Survey Area.

Following collation of data from all survey sites and mapping notes, vegetation associations were described and codes assigned to the vegetation mapping polygons and marked onto 1: 10,000 colour aerial photographs. Completed vegetation mapping was sent to CAD Resources Pty Ltd for digitization.

Vegetation condition was mapped according to vegetation association boundaries throughout the Survey Area, using a combination of quadrat and relevé data, weed record points (WRPs) and inference from these two data sources. Condition was recorded at each survey site according to the five point ranking system of the Kaesehagen (1994) scale (Appendix E), and then applied to the whole vegetation association polygon it was mapped within. Weed record points are opportunistic collection points of weed information, identifying presence or absence or introduced flora species within a 5 m by 5 m search area. Where a WRP identifies the presence of introduced flora, the density and location of that species is recorded. These points were overlaid on the survey site condition maps and where vegetation association polygons had a WRP, (but otherwise no condition assigned) the density information was converted to one of the five conditions ratings. Any polygons that remained without a condition attribute following this process had condition inferred based on the average condition of that vegetation association. Where an average was not able to be readily determined the highest condition was presented.

## 2.3 Data Collation and Interpretation

### 2.3.1 Specimen Identification and Data Entry

Species not able to be positively identified in the field were collected, given a unique collection number and pressed. Specimens were air-dried and later identified by Astron botanists and other consultants. Specimen identification was conducted by botanists experienced with Pilbara flora. The majority of specimen identification was completed by Raimond Orifici (Astron), Kelli McCreery (consultant botanist), Janelle Atkinson (Astron) and Andrew Mitchell (consultant botanist). Astron botanists Britta Mathews, Brian Vincent and Jeni Alford also assisted with confirmation of specimen names. Specialist Pilbara taxonomist Mr Malcolm Trudgen assisted in identifying difficult specimens and those with restrictive material, in particular the Malvaceae family. Dr Bevan Buirchell assisted in the identification of *Eremophila* species and Mr Bruce Maslin assisted in confirmation of *Acacia* species, in particular the Mulga complex. Specimens were identified to the lowest possible classification (i.e. species, sub species or variant) according to the availability of descriptive vegetative parts able to be collected.

Data from each quadrat and relevé were entered into a customised Access database developed by Mr. Ted Griffin. Data entry was completed by Astron botanists and scientists, including Natalie Krawczyk, Jesse Kalic, Alice Bott, David Thompson, Julie Fielder, Daniel Roocke, Travis Doehring,

Toby Dight, Clemency Wilson, Jessie-Leigh Brown, Ebony Jones, and Libby Alderman. Due to the names of some taxa having been recently revised, the species list was updated to reflect current nomenclature.

### 2.3.2 Floristic Analysis

Following completion of the field survey and identification of vascular taxa, numerical analysis based on presence / absence of species was conducted to assist in identifying numerical (floristic) groups. Details of the analyses conducted are presented in Appendix F. The floristic analysis was conducted by Astron Senior Scientist, Mr Dan Jarvis.

The 78 sites sampled as part of the level 2 HRA and HGP surveys were included in the analyses. A total of 267 sites sampled from the Hardey Rail Corridor (HRC) and Hardey Borrow Pits (HBP) (Astron 2011a) were also included as part of the project for the analyses, including sites sampled as part of the HRC but which fell outside of the current alignment due to design changes. In addition, 204 comparable sites from level 2 WPIOP Stage 1 surveys (Mount Stuart Access Track, Gas Pipeline, Airstrip Access Track and Southern Access Road) were included to provide a regional comparison.

The species lists of all projects were reconciled to maintain compatibility in nomenclature. Any taxa not confirmed to species level were removed from the analyses and taxa with infraspecific ranks (i.e. variants or forms) were reduced to the relevant species i.e. *Scaevola spinescens* (broad leaf form) and *S. spinescens* (narrow leaf form) were all listed as *S. spinescens*. Annual and ephemeral species were included as the majority of sites were surveyed at least once following adequate rain.

### 2.3.3 Vegetation Attributes Assessment

To assist in identifying the relative value of particular vegetation associations throughout the Survey Area, all were assessed according to presence of a number of attribute criteria defined according to the following categories:

- **Area and Location**– the presence of an attribute relating to a value assessment based on the size and geographic location of the vegetation association;
- **Component**– the presence of an attribute relating to a feature of conservation value within the vegetation association;
- **Condition**– the presence of an attribute relating to an Excellent assessment of vegetation condition.

Details of the criteria used in each attribute category are provided in Table 9.



Table 9: Vegetation Attributes Assessment Criteria.

Attribute Categories	Attribute Criteria	Criteria Description
Area and Location	Land System	Occurs within a Land System that has a restricted representation in the Pilbara (may occur within a specific part of the region and /or constitutes a small area).
		Occurs within an area that is on the edge or beyond the normal distribution of that Land System.
	Reservation Priority	Analogous to an ecosystem rated as having a High reservation Priority (IBRA).
		Analogous to an ecosystem rated as having a Medium reservation Priority (IBRA).
Component	Floristic values	Supports DRF.
		Supports Priority Flora.
		Supports flora outside of their known / normal range.
	Ecological values	Represents a Threatened Ecological Community.
		Represents a Priority Ecological Community.
	Threat	Is analogous to an ecosystem listed as 'At Risk' by the IBRA documents.
	Function	Supports flora or land feature that may provide important local habitat to fauna.
	Resilience	Supports flora considered sensitive to potential disturbances such as dust, altered drainage, erosion, water drawdown.
Restriction	Supports flora restricted to a particular local habitat.	
Condition	Condition	Condition Excellent. Few weed species present and non-invasive species. Little evidence of other disturbance such as grazing.

The relative value of the vegetation was then assessed according to the number of categories each vegetation association satisfied. A summary of the category classes into which vegetation could be placed is given in Table 10.

Table 10: Category classes of vegetation according to number of attribute categories

Number of Attribute Categories	Specified Attribute Categories
3	Area and Location, Component, Condition
2	Area and Location, Component
	Area and Location, Condition
	Component, Condition
1	Area and Location
	Component
0	Condition
0	No attributes

The proportional representation of each vegetation association within the Survey Area was also calculated, but is not considered as an attribute.

## 2.4 Limitations

Following completion of the desktop assessment and field survey, a review of any limitations that may affect a complete assessment of the data collected was conducted. The limitations listed are based on those suggested as considerations in Guidance Statement 51 (EPA 2004). The limitations of this survey are summarised in Table 11.

**Table 11: Statement of limitations.**

Potential limitation	Statement regarding potential limitations
<p><b>(i) Sources of information and availability of contextual information.</b> Is the region well documented?</p>	Contextual information is limited to the broad information provided by IBRA (Kendrick 2001a; Kendrick 2001b); Beard (1975) mapping; and Payne <i>et al.</i> (1988).
<p><b>(ii) Scope.</b> The level of survey and detail required to undertake the survey. Was there adequate time to complete the survey to the desired standard?</p>	<p>The time allocated to the survey was adequate to complete the survey to the desired level.</p> <p>Due to the access and time practicalities of conducting a comprehensive survey over a large area in a remote location, some generalisations, particularly in regard to vegetation mapping, needed to be made. These are not likely to have affected the outcomes of this survey.</p>
<p><b>(iii) Proportion of flora collected and identified.</b> Was the survey sampling, timing and intensity considered adequate? Was the survey conducted at what was considered an appropriate time of the year for plant identification? Were any taxonomic groups considered to be under-represented?</p>	<p>The surveys were conducted between March 2009, and late June 2011. Field trips were scheduled to follow predicted peak rainfall times in summer and winter. During the 2009 – 2010 season rainfall was generally lower than average. Seasonal conditions until mid 2009 were considered adequate, following over 150 mm falling in late February, however seasonal conditions after this were considered poor with few annual and ephemeral species recorded. The Phase 1 surveys of the HGP were conducted during particularly poor conditions in 2010, when the combined effects of drought and grazing severely restricted the number of taxa represented. The quality of specimens able to be collected during the poor conditions also declined and restricted the confidence with which identifications could be made.</p> <p>Considerable rain (approximately 310 mm) fell during the summer of 2010 – 2011 and resulted in a general improvement in vegetation health, as well as much greater floristic richness, particularly of annual and ephemeral species. The number of taxa able to be recorded, as well as the quality of specimens collected and able to be identified during the 2011 surveys improved considerably. Sampling, timing and intensity of Phase 2 surveys was therefore considered adequate.</p> <p>As few other botanical surveys are known to have occurred in the area it is difficult to understand whether the suite of species collected is typical or if any families or genera are considered under represented. Few Asteraceae taxa were recorded during all surveys, yet the suite of species associated with the Fabaceae, Poaceae and Malvaceae families probably reflects their true dominance in this area.</p>

Potential limitation	Statement regarding potential limitations
<p><b>(iv) Completeness.</b> Is there further work which may be required i.e. was the relevant area fully surveyed?</p>	<p>The Survey Area was considered adequately surveyed to compile a representative list of species, including any Priority flora or introduced species, which may occur, as well as describe and map vegetation at a level appropriate for management decisions.</p>
<p><b>(v) Mapping reliability.</b> Were the aerial photographs, satellite images and site maps available considered adequate to fully understand the area surveyed? Was the mapping generated considered to have a high degree of reliability?</p>	<p>Colour aerial photography at a scale of 1: 10,000 was used to locate the Survey Area on the ground and to assist in navigation and delineation of vegetation boundaries. The aerial mapping was of good resolution and accurately represented ground conditions.</p> <p>Vegetation was mapped to association level and in many instances the vegetation mapping directly relates to changes in landform. Where these landform changes were at a scale or relief unable to be captured in a meaningful or accurate way on the 1: 10,000 aerial photography they were not presented. As a result, not all vegetation change has been captured, and this typically relates to the often restricted and isolated occurrences of rockpiles, sheer rock faces, rocky mantles and potential soaks that occur in the Survey Area.</p>
<p><b>(vi) Timing.</b> When was the survey conducted in terms of season, rainfall, severe weather events etc. Was the survey conducted at an appropriate time for access, observation of the optimal suite of species and for identification of flowering and fruiting species?</p>	<p>Seasonal conditions were considered adequate for the surveys conducted in the first half of 2009 as greater than average rain had fallen in the months preceding. Seasonal conditions from mid 2009 onwards were considered poor with below average rainfall falling and the number of annual and ephemeral species recorded during the later surveys reduced considerably. Above average rainfall in the months preceding the Phase 2 surveys resulted in a considerable increase in the suite of species able to be recorded. The quality of specimens able to be collected at this time also improved and allowed greater certainty in the identification of taxa.</p> <p>The timing of the survey had no implications for access to the site.</p>
<p><b>(vii) Disturbance.</b> Had the survey area been impacted by any disturbance which may have limited the survey, i.e. fire, flood, accidental human intervention etc?</p>	<p>Considerable disturbance occurred within the HRA following commencement of the Phase 1 surveys. The clearing of access tracks and drill pads resulted in 13 quadrats being partially disturbed between the Phase 1 and Phase 2 surveys being conducted.</p>
<p><b>(viii) Intensity.</b> In retrospect, was the intensity considered to be adequate?</p>	<p>The intensity of the survey was considered adequate to compile a representative species list, record any conservation significant flora and weed species present, and map the vegetation of the Survey Area to association level.</p>
<p><b>(ix) Resources.</b> Were the appropriate tools and materials available to complete the task effectively?</p>	<p>Resources were adequate to complete the survey and all appropriate tools and materials required to complete the task were available.</p>
<p><b>(x) Access.</b> Were there any factors limiting access to the survey area?</p>	<p>Much of the Survey Area was able to be accessed by vehicle; areas that were unable to be reached by vehicle were accessed and traversed by foot.</p>

Potential limitation	Statement regarding potential limitations
<p><b>(xi) Experience.</b> Were personnel undertaking the field survey and plant identification trained and/or experienced in undertaking the required tasks?</p>	<p>The botanists responsible for undertaking the field survey have considerable experience in conducting vegetation and flora surveys in the Pilbara. Similarly, the identification of specimens was conducted by personnel trained and experienced with identification of flora in the Pilbara region. Specialist taxonomists were used where required.</p>

## 3 Results

### 3.1 Desktop Assessment

#### 3.1.1 Database Search Result

No TECs or Threatened Flora listed under the EPBC Act were identified in the search area by the Protected Matters Search Tool (DEWSPC 2011).

One terrestrial TEC is listed on the DEC Threatened Ecological Communities and Priority Ecological Communities database for the Pilbara Bioregion: '*Themeda* grasslands on cracking clays' (DEC 2010a). No TECs are listed for the Gascoyne Bioregion. No TECs or PECs have been recorded within 50 km of the Survey Area (DEC 2011a).

The DEC Threatened Ecological Communities and Priority Ecological Communities database search results are presented in Appendix G. It should be noted that these database searches were conducted prior to release of the updated PEC list for Western Australia in 2011, however new listings were reviewed by Astron prior to compilation of this report (see Section 2.1.1).

The DEC Florabase and Western Australian Herbarium database searches indicated that two species listed as DRF, *Lepidium catapycnon* and *Thryptomene wittweri*, have been recorded within 50 km of the Survey Area. In addition, 65 Priority flora species have been recorded within the search area (DEC 2010b). Based on information of their habitat preferences and previously recorded locations, 37 of these species are considered to have greater potential to occur within the Survey Area (Table 12) (Western Australian Herbarium 2011).

Table 12: Summary of Priority Flora recorded within 50 km of the Survey Area (DEC, 2010b).

Species	Conservation Status	Life Form	Known Habitat Details	Likelihood of Occurrence
<i>Acacia bromilowiana</i>	Priority 4	Tree or shrub	Red, skeletal stony loam, banded ironstone, basalt or laterite on rocky hills, breakaways, gorges and creek beds.	Potential
<i>Acacia dawsoniana</i>	Priority 3	Shrub	Stony, red, skeletal loam; low rocky rises; drainage lines on lower scree slopes.	Potential
<i>Acacia effusa</i>	Priority 3	Low shrub	Stony red loam on scree slopes of low ranges.	Potential
<i>Acacia subtiliformis</i>	Priority 3	Spindly shrub	On rocky calcrete plateau.	Unlikely
<i>Adiantum capillus-veneris</i>	Priority 2	Perennial fern (herb)	Moist sheltered sites in gorges and on cliff walls.	Potential
<i>Adiantum hispidulum</i>	Priority 2	Perennial fern (herb)	In crevices of lateritic rocks.	Unlikely
<i>Aluta quadrata</i>	Priority 1	Shrub	Edge of creek beds, base of cliffs, rocky crevices.	Potential
<i>Ampelopteris prolifera</i>	Priority 3	Perennial fern (herb)	Near water or in wet ground; drainage line gullies at base of cliffs.	Unlikely
<i>Aristida calycina</i> var. <i>calycina</i>	Priority 2	Grass-like perennial or herb	On red earths, sands and alluvial soils; hardpan plain.	Unlikely
<i>Aristida lazaridis</i>	Priority 2	Grass-like perennial or herb	On sand or loam; crest of ironstone hill.	Potential
<i>Barbula ehrenbergii</i>	Priority 1	Moss (herb) annual or perennial	Habitat details unavailable.	Unknown
<i>Bothriochloa decipiens</i> var. <i>cloncurrans</i>	Priority 1	Perennial grass	Drainage depression with <i>Eucalyptus camaldulensis</i> ; on stony clay plain with Mulga.	Potential
<i>Brachyscome</i> sp. Wanna Munna Flats (S. van Leeuwen 4662)	Priority 1	Herb (annual)	Low terrain, red cracking clay-loam, Mulga woodland.	Unlikely
<i>Calotis latiuscula</i>	Priority 3	Herb (annual/ perennial)	Rocky hillsides; floodplains; rocky creeks or river beds.	Potential
<i>Calotis squamigera</i>	Priority 1	Herb (annual)	Pebbly loam; Mulga low open woodland in poorly defined flowline on a plain.	Unlikely
<i>Cladium procerum</i>	Priority 2	Grass-like perennial sedge or herb	Growing in perennial pools; water's edge or flood zone of creeks.	Unlikely

Species	Conservation Status	Life Form	Known Habitat Details	Likelihood of Occurrence
<i>Dampiera anonyma</i>	Priority 3	Herb (perennial)	Skeletal gravelly soils over banded ironstone, basalt, shale and jaspilite on hill summits and upper slopes (above 1000 m.).	Potential
<i>Dampiera metallorum</i>	Priority 3	Herb (perennial)	Skeletal red-brown gravelly soil over banded ironstone, on steep slopes and summits of hills.	Potential
<i>Eragrostis</i> sp. Mt. Robinson (S. van Leeuwen 4109)	Priority 1	Perennial grass	Red-brown skeletal soils and ironstone on steep slopes and hill summits.	Potential
<i>Eremophila forrestii</i> subsp. <i>Pingandy</i> (M.E. Trudgen 2662)	Priority 2	Small shrub (perennial)	Mulga low woodland, flat plain.	Unlikely
<i>Eremophila forrestii</i> subsp. <i>viridis</i>	Priority 3	Small shrub (perennial)	On sandy Spinifex ( <i>Triodia</i> ) plain. Recorded in Onslow.	Unlikely
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	Priority 4	Shrub	Skeletal soils over ironstone on rocky screes.	Potential
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	Priority 3	Shrub	Skeletal soils over ironstone on summits.	Potential
<i>Eremophila shonae</i> subsp. <i>diffusa</i>	Priority 3	Small shrub	Stony yellow or red sandy soils; shaly red-brown clay loams in Mulga woodland.	Unlikely
<i>Eremophila</i> sp. Snowy Mountain (S. van Leeuwen 3737)	Priority 1	Shrub (perennial)	Summit of hill, high in landscape; skeletal red soil over massive ironstone.	Potential
<i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4068)	Priority 1	Shrub (perennial)	Summit of hill, high in landscape; skeletal red soil over massive banded ironstone.	Potential
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	Priority 4	Shrub	Depressions on red-brown clay or sandy loams, mainly in Mulga woodland.	Unlikely
<i>Eriachne</i> sp. Dampier Peninsula (K.F. Kenneally 5946)	Priority 3	Fine grass/ herb	Sandy clay of pindan soils; sand dunes with red sand; shallow soil amongst massive sandstone.	Unlikely
<i>Eucalyptus lucens</i>	Priority 1	Tree/Mallee	Grows on ironstone on rocky slopes and mountain tops, high in the landscape.	Potential

Species	Conservation Status	Life Form	Known Habitat Details	Likelihood of Occurrence
<i>Euphorbia</i> sp. Mt. Bruce Flats (S. van Leeuwen 3861)	Priority 2	Spreading herb or groundcover	Sump, low in landscape, alluvial cracking clay loamy soil with ironstone.	Unlikely
<i>Euphorbia stevenii</i>	Priority 3	Succulent perennial herb	On clay and sandy soils; basaltic soils and black cracking clay.	Unlikely
<i>Fimbristylis sieberiana</i>	Priority 3	Tufted sedge (perennial)	Mud and skeletal soil pockets on pool edges and sandstone cliffs.	Unlikely
<i>Geijera salicifolia</i>	Priority 3	Tree	Skeletal soils or stony soils on massive rock screes or in gorges.	Potential
Genus sp. Hamersley Range hilltops (S. van Leeuwen 4345)	Priority 1	Shrub (daisy) (perennial)	Skeletal soils over ironstone, rocky slopes, hill summits.	Potential
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	Priority 3	Herb (annual/ biennial)	Red-brown clay soil with calcrete pebbles on low undulating plains or swampy plains.	Unlikely
<i>Helichrysum oligochaetum</i>	Priority 1	Herb (annual)	Red clay on alluvial plains.	Unlikely
<i>Indigofera gilesii</i> subsp. <i>gilesii</i> ms	Priority 3	Shrub (perennial)	Pebbly loam amongst boulders and outcrops, hills, near creeklines.	Potential
<i>Indigofera ixocarpa</i>	Priority 2	Shrub	Skeletal red soils over massive ironstone.	Potential
<i>Indigofera</i> sp. Bungaroo Creek (S. van Leeuwen 4301)	Priority 3	Shrub	Drainage lines/creeks in hills or on plains.	Potential
<i>Iotasperma sessilifolium</i>	Priority 3	Herb (annual)	On cracking clay, black loam. Edges of waterholes, plains.	Unlikely
<i>Isotropis parviflora</i>	Priority 2	Perennial herb or subshrub	Clay of lower slope; valley slope of ironstone plateau.	Unlikely
<i>Lepidium catapycnon</i>	Declared Rare	Herb or shrub (perennial)	Skeletal soils on hillsides and hilltops.	Potential
<i>Nicotiana umbratica</i>	Priority 3	Short-lived annual/perennial herb	On shallow soils of rocky outcrops.	Potential
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	Priority 3	Herb (annual)	Cracking clay, basalt on gently undulating plain with large surface rocks or flat crabholed plain.	Unlikely
<i>Olearia mucronata</i>	Priority 3	Small shrub	On schistose hills, along drainage channels, in gullies and steep hill upper slopes.	Potential
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	Priority 2	Herb (annual)	In gullies and on gully walls.	Potential



Species	Conservation Status	Life Form	Known Habitat Details	Likelihood of Occurrence
<i>Pilbara trudgenii</i> ms.	Priority 2	Shrub (perennial)	On hill summits, steep slopes, stony soil over ironstone, screes and cliff faces.	Potential
<i>Polymeria distigma</i>	Priority 3	Prostrate herb (perennial)	Sandy soils, crabhole/ cracking clay plains, red sandy laterite.	Unlikely
<i>Ptilotus crosslandii</i>	Priority 3	Prostrate herb (?perennial)	Sandy soils on colluvial plains.	Unlikely
<i>Ptilotus subspinescens</i>	Priority 3	Small shrub	On gentle rocky slopes, screes and scree bases.	Potential
<i>Ptilotus trichocephalus</i>	Priority 4	Prostrate herb (perennial)	Sandy soils on colluvial plains.	Unlikely
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	Priority 3	Shrub (perennial)	Red clay loam, Mulga woodland, clay plains, flood plains.	Unlikely
<i>Rhynchosia bungarensis</i>	Priority 4	Prostrate shrub	Pebbly, shingly coarse sand amongst boulders; flow line banks of gully mouth in a valley wall.	Potential
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	Priority 3	Herb or shrub (annual or perennial)	Ironstone soils, creeks, rocky hills, plain – flood plain, rock crevice of hills.	Potential
<i>Scaevola</i> sp. Hamersley Range basalts (S. van Leeuwen 3675)	Priority 2	Shrub	Skeletal, gritty soil over basalt on steep hills and at summit of steep hills.	Potential
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	Priority 3	Shrub	Skeletal red soil pockets on steep slopes.	Potential
<i>Sida</i> sp. Hamersley Range (K. Newbey 10692)	Priority 1	Shrub	Rocky breakaway, side of gorge, summit of hill (high in landscape).	Potential
<i>Spartothamnella puberula</i>	Priority 2	Shrub	Skeletal soils, rocky loam, clay on sandplains, hills and in gullies.	Potential
<i>Swainsona</i> sp. Hamersley Station (A.A. Mitchell 196)	Priority 3	Prostrate herb (annual)	Flat crabholed/cracking clay plain.	Unlikely
<i>Tetratheca fordiana</i>	Priority 1	Small shrub	Shale pocket amongst ironstone, mid to upper hillslope.	Potential
<i>Thryptomene wittweri</i>	Declared Rare	Shrub	Skeletal soils, breakaways, high in landscape, steep scree slopes and vertical sheer cliff faces.	Potential
<i>Triodia</i> sp. Mt. Ella (M.E. Trudgen 12739)	Priority 3	Perennial hummock grass	Pebbly loam, amongst rocks and outcrops, gully slopes and on hill crests.	Potential

Species	Conservation Status	Life Form	Known Habitat Details	Likelihood of Occurrence
<i>Triodia</i> sp. Robe River (M.E. Trudgen <i>et al.</i> MET 12367)	Priority 3	Perennial hummock grass	Mesa tops and edges, breakaways, hillsides/ hilltops.	Potential
<i>Vigna</i> sp. Central (M.E. Trudgen 1626)	Priority 2	Prostrate annual or perennial herb or subshrub	Sandy plain (in lee of coastal sand dunes) over compacted hardpan and limestone.	Unlikely
<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	Priority 1	Herb (annual)	On flats, cracking clay or clay-loam plain.	Unlikely

### 3.1.2 Literature Review

The results of the four reports reviewed as part of the literature review are presented in Table 13.

Table 13: Summary of literature review of similar projects in the Hamersley subregion of the Pilbara.

Consultant Report	Survey Location	Number of Sample Sites	Vegetation recorded	Flora recorded	Priority Flora Recorded	Introduced Species Recorded
Biota Environmental Sciences (Biota). 2005. <i>Vegetation and Flora Survey of Mesa A and Mesa G, near Pannawonica.</i>	43 km west of Pannawonica. Project area size: 3275.7 ha.	49 quadrats; unreported number of relevés.	23 vegetation types. No TECs or PECs recorded.	257 species 48 families 111 genera.	2 x P3: <i>Abutilon trudgenii</i> ms, and <i>Sida</i> sp. Wittenoom (WR Barker 1962).  <i>Triodia</i> sp. Nov was also recorded which is now recognized as the P3 species <i>Triodia</i> sp. Robe River.	8 species: <i>Argemone ochroleuca</i> ssp. <i>ochroleuca</i> , <i>Bidens bipinnata</i> , <i>Cenchrus ciliaris</i> , <i>Citrullus colocynthis</i> , <i>Datura leichhardtii</i> , <i>Echinochloa colona</i> , <i>Euphorbia hirta</i> , <i>Malvastrum americanum</i> .
Biota Environmental Sciences (Biota). 2008. <i>Marandoo Mine Phase 2 Project Vegetation and Flora Survey.</i>  (This survey follows on from work conducted by Mattiske in 1992 and is therefore not a comprehensive survey).	37 km east of Tom Price. Project area size: 4921.6 ha.	44 quadrats; 3 relevés.	28 broad vegetation units. No TECs or PECs recorded.	537 species 60 families 176 genera.	5 x P1: <i>Calotis latiuscula</i> , <i>Goodenia lyrata</i> , <i>Josephinia</i> sp. Marandoo (M.E. Trudgen 1554), <i>Labelia heterophylla</i> subsp. Pilbara (R. Meissner & Y. Caruso 1), <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794); 1 x P2: <i>Indigofera ixocarpa</i> ; and 1 x P4: <i>Eremophila magnifica</i> ssp. <i>magnifica</i> .	20 species: <i>Acetosa vesicaria</i> , <i>Bidens bipinnata</i> , <i>Bassia scoparia</i> , <i>Bougainvillea</i> sp., <i>Cenchrus ciliaris</i> , <i>Cenchrus setiger</i> , <i>Chloris virgata</i> , <i>Cucumis melo</i> subsp. <i>agrestis</i> , <i>Cynodon dactylon</i> , <i>Datura leichhardtii</i> , <i>Echinochloa colona</i> , <i>Euphorbia hirta</i> , <i>Euphorbia peplus</i> , <i>Malvastrum americanum</i> , <i>Portulaca oleracea</i> , <i>Setaria verticillata</i> , <i>Vachellia farnesiana</i> , <i>Solanum nigrum</i> , <i>Sigesbeckia orientalis</i> , <i>Sonchus oleraceus</i> .

Consultant Report	Survey Location	Number of Sample Sites	Vegetation recorded	Flora recorded	Priority Flora Recorded	Introduced Species Recorded
Mattiske Consulting Pty Ltd (Mattiske). 2008. <i>Flora and vegetation on the Hope Downs 4 Mine and Village/ Camp Area.</i>	60 km northwest of Newman. Project area size not reported.	678 reference sites including 221 quadrats.	No TECs or PECs recorded.	472 species 52 families 153 genera.	2 x P1: <i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP727), and <i>Rhagodia</i> sp. Hamersley (M.E. Trudgen 17794); 3 x P3: <i>Olearia fluvialis</i> , <i>Themeda</i> ?sp. Hamersley Station (M.E. Trudgen 11431), and <i>Gymnanthera cunninghamii</i> ; and 1 x P4: <i>Eremophila youngii</i> ssp. <i>lepidota</i> (ms).	6 species: <i>Alternanthera pungens</i> , <i>Bidens bipinnata</i> , <i>Chloris virgata</i> , <i>Cenchrus ciliaris</i> , <i>Portulaca oleracea</i> , <i>Sonchus</i> sp.
Western Botanical. 2010. <i>Flora and Vegetation of the Proposed Mine &amp; Associated Infrastructure Areas West Pilbara Iron Ore Project</i>	50 km southwest of Pannawonica. Project area size not reported.	217 quadrats. 342 relevés.	154 vegetation types. No TECs or PECs recorded.	442 species 52 families 140 genera.	3 x P3: <i>Indigofera</i> sp. Bungaroo Creek (S. van Leeuwen 4301), <i>Owenia acidula</i> , <i>Rhynchosia bungarensis</i> .	7 species: <i>Argemone ochroleuca</i> ssp. <i>ochroleuca</i> , <i>Cenchrus ciliaris</i> , <i>C. setiger</i> , <i>Cucumis melo</i> ssp. <i>agrestis</i> , <i>Malvastrum americanum</i> , <i>Setaria verticillata</i> , <i>Vachellia farnesiana</i> .

^ Species has been removed from the DRF and Priority Flora list in Western Australia (Western Australian Herbarium 2011).

### 3.1.2.1 'At Risk' Ecosystems

Of the 15 ecosystems listed by Kendrick (2001a) as being 'at risk' in the Hamersley subregion, the ecosystems that may be relevant to the vegetation and/or flora of the Survey Area are listed below:

- Valley floor Mulga (Vulnerable);
- Lower-slope Mulga (Endangered);
- Hill-top floras, Hamersley Range (Vulnerable); and
- All major ephemeral water courses (Vulnerable).

Six ecosystems are listed by Kendrick (2001b) as being 'at risk' in the Ashburton subregion. One of these may be relevant to the Survey Area:

- Mulga creekline community, alluvial plains of Ashburton (type Mulga creekline pasture land (MUCR) in Payne *et al.* 1988).

### 3.1.2.2 Reservation Priority

Of each of the ecosystems listed for the Hamersley subregion, 13 are considered to be of Medium and 26 of High reservation priority (Kendrick 2001a). Of the 37 ecosystems listed for the Ashburton subregion, 19 are considered to be of Medium and 17 of High reservation priority (Kendrick 2001b).

The Beard (1975) vegetation associations mapped in the Survey Area and their reservation priority in the Hamersley and Ashburton subregions are presented in Table 14. The ecosystems at risk were not correlated to Beard (1975) vegetation associations. The total area and proportion of each Beard vegetation association present in the Survey Area is presented in Section 1.3.4.

**Table 14: Reservation priority of Beard (1975) vegetation associations recorded in the Survey Area (Kendrick, 2001a; and Kendrick, 2001b).**

Beard Vegetation Association Code	Reservation Priority Hamersley subregion	Reservation Priority Ashburton subregion
82	Low	Medium
160	High	High
162	High	Medium
181	Medium	High
567	Low	Medium

### 3.1.3 Seasonal Conditions

At Paraburdoo Airport (weather station 007185) there had been approximately 301 mm of rain in the 12 months preceding the commencement of Trip 1 in April 2009 (BOM 2011) (Figure 4). This is consistent with the long term mean annual rainfall for Paraburdoo of 306 mm (BOM 2011). A rain-bearing depression had brought the majority (175 mm or 58 %) of annual rain in February 2009, approximately two months prior to Trip 1.

In the 12 months preceding Trip 2 in August 2010, approximately 133 mm of rain was recorded at Paraburdoo, 40 mm of which occurred in March 2010, with only minor rainfall after that time. This is well below the long term mean annual rainfall of 306 mm for this location (BOM 2011) (Figure 4). Between Trip 2 in August and Trip 3 in October 2010, approximately 38 mm of rainfall was recorded at Paraburdoo (Figure 4). This is above the mean of 16 mm for this period.

Approximately 294 mm of rain was recorded at Paraburdoo Airport between January and April 2011, a total of 96 % of the average annual rainfall. An additional 68 mm of rain was recorded between April and the last trip in June 2011 (Trip 7) (BOM 2011), prolonging the favourable seasonal conditions (Figure 4).

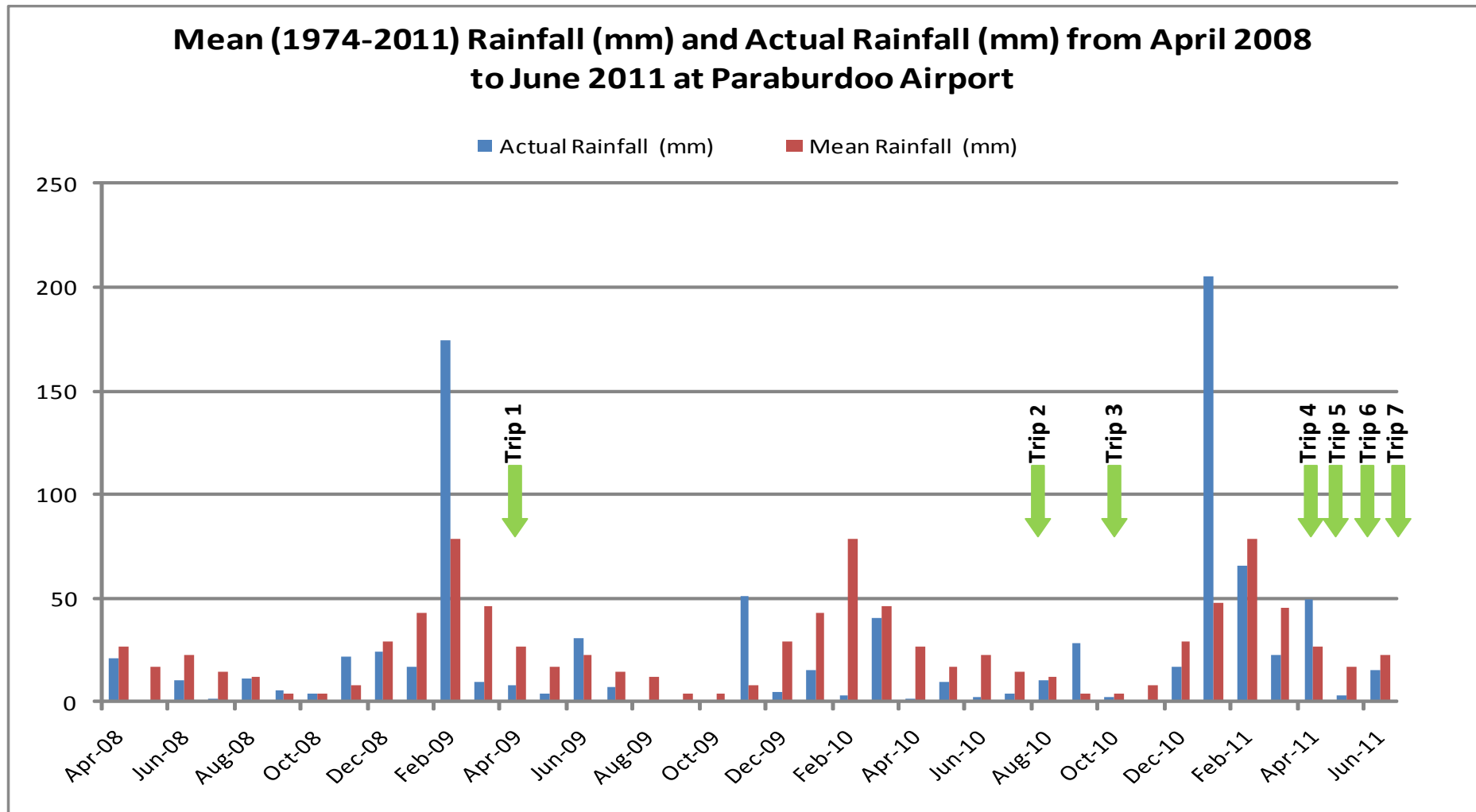


Figure 4: Long term (1974-2010) Mean Rainfall and Actual Rainfall recorded at Paraburdoo Airport from April 2009 to June 2011 (BOM, 2011). Green arrows depict Phase 1 and Phase 2 trip dates.



## 3.2 Field Survey

### 3.2.1 Vegetation Overview

The HRA occurs on the southern edge of the Hamersley Range. The iron rich formations here support *Eucalyptus leucophloia* subsp. *leucophloia* (Snappy Gum) with *Acacia* spp. over hummock grasslands of the hard *Spinifex Triodia wiseana*. Scree slopes are dominated by *Acacia aptaneura* (a variety of Mulga) over *Eremophila* spp. and *Senna* spp., and reflect the close proximity to the Ashburton botanical district. The geology forms an erosion resistant mantle around the edges of scarp formations, narrow gullies, caves, ledges and sheer rock faces support an array of herbaceous species. Lower slopes and stony rises are dominated by *T. wiseana* and *T. angusta* with a sparse shrub steppe strata. On the northern, southern and eastern periphery of the deposits, rolling hills abound and are dominated by *Acacia arida* over *T. wiseana*. A number of doleritic rockpiles occur along these hills, and although variable, tend to support *Senna* and *Eremophila* spp. over a suite of herbaceous species and tussock grasses.

Small patches of gibber plains occur in the southern and eastern parts of the HRA. These are dominated by *Acacia xiphophylla* (Snakewood) over a sparse chenopod and tussock grass lower strata. Tributaries of the Hardey River occur in the HRA and support *Eucalyptus victrix*, *E. leucophloia* subsp. *leucophloia*, as well as tree-forming *Acacia* spp. including *A. citrinoviridis* and *A. coriacea* subsp. *pendens*, over a mixed hummock and tussock grass strata. Isolated dense stands of *Melaleuca glomerata* over a mixed spp. herbland and open tussock grassland were observed along one drainage system in the HRA and were likely to be associated with a higher water table.

For the most part, the HGP occurs on the floodplain of the Hardey River. This area is dominated by *A. citrinoviridis* and *A. synchronicia* over *\*Cenchrus ciliaris* (Buffel Grass) open tussock grassland. Patches of *A. xiphophylla* occur interspersed on gibber plains in the northern part of the alignment, with drainage tracts dominated by *A. citrinoviridis*, *A. kempeana*, and *A. aptaneura* over mixed open hummock and tussock grasslands also occurring.

### 3.2.2 Vegetation Associations

A total of 25 vegetation associations were described within the Survey Area. Vegetation mapping is presented in Appendix H. The raw data collected from each quadrat and relevé is presented in Appendix I and photos from each site are presented in Appendix J. Descriptions of vegetation associations and their related land systems are provided in the following section according to broad landforms.

#### Hills and Breakaways

**Hi03** *Triodia wiseana* (*T. angusta*) hummock grassland with *Senna* spp., *Stylobasium spathulatum*, *Acacia synchronicia* scattered shrubs to open shrubland.

This vegetation occurs on the slopes of hills in the central part of the HRA. The composition and dominance of the sparse shrub steppe stratum varies throughout. Associated species include *Acacia arida*, *A. bivenosa*, *A. pruinocarpa*, *Cleome viscosa*, *Dysphania rhadinostachya* subsp. *rhadinostachya*, *Enneapogon caerulescens*, *E. lindleyanus*, *E. polyphyllus*, *Eremophila cuneifolia*, *Gomphrena cunninghamii*, *Iseilema membranaceum*, *Mollugo molluginea*, *Oldenlandia crouchiana*, *Polycarpaea longiflora*, *Ptilotus auriculifolius*, *P. exaltatus* var. *exaltatus*, *P. clementii*, *P. fusiformis*, *P. obovatus*, *Salsola tragus* subsp. *tragus*, *Senna glutinosa* subsp. *glutinosa*, *S. glutinosa* subsp. *pruinosa*, *S. glutinosa* subsp. *x luerssenii*, *Solanum ashbyae*, *S. gabriellae*, *Trachymene oleracea* subsp. *oleracea*, *Tribulus suberosus*.

Quadrat /relevés: 1RAr10, 1RA07, 1RA14, 1RA15, 1RA16, 1RA18, 1RA34, 3RAr01

Land System: Cheela, Newman and Rocklea

Total Area HRA: 137.0 ha (10.0 %)  
 Total Area HGP: 0 ha  
 Condition: Good-Fair

**Hi04** Acacia spp. and Eremophila spp. open shrubland over Triodia wiseana (T. angusta) open hummock grassland and Cymbopogon ambiguus scattered tussock grasses.

This vegetation occurs on dolerite rockpiles in the northern part of the HRA. More of these rockpiles occur but were not mapped due to scale constraints. The dominance of the shrub species varies between rockpiles. Associated species include *Abutilon dioicum*, *Acacia arida*, *A. bivenosa*, *A. pruinocarpa*, *A. pyriformis*, *A. synchronicia*, *A. tetragonophylla*, *Amaranthus cuspidifolius*, *A. mitchellii*, *Cheilanthes lasiophylla*, *Crotalaria medicaginea* var. *neglecta*, *Cucumis maderaspatanus*, *Cymbopogon ambiguus*, *Eremophila longifolia*, *E. platycalyx* subsp. *pardalota*, *Hakea chordophylla*, *Jasminum didymum* subsp. *lineare*, *Lobelia heterophylla* subsp. *pilbarensis*, *Notoleptopus decaisnei* var. *orbicularis*, *Oldenlandia crouchiana*, *Senna glutinosa* subsp. *glutinosa*, *S. glutinosa* subsp. *pruinosa*, *Trachymene pilbarensis*, *Tribulus suberosus*, *Triumfetta clementii*.

Quadrat /relevés: 2RA19, 2RAr16  
 Land System: Rocklea  
 Total Area HRA: 2.1 ha (0.2 %)  
 Total Area HGP: 0 ha  
 Condition: Excellent

**Hi08** Acacia aptaneura low open woodland over Senna spp. and Eremophila spp. scattered shrubs to open shrubland over Triodia wiseana (T. angusta) very open hummock grassland.

This vegetation occurs on steep scree slopes throughout the HRA. Associated species include *Abutilon dioicum*, *Acacia pruinocarpa*, *A. synchronicia*, *A. tetragonophylla*, *Amyema fitzgeraldii*, *\*Cenchrus ciliaris*, *Cymbopogon ambiguus*, *C. obtectus*, *Dodonaea petiolaris*, *Duperreya commixta*, *Enchylaena tomentosa* var. *tomentosa*, *Eremophila cuneifolia*, *E. cryptothrix*, *E. platycalyx* subsp. *pardalota*, *Eremophila latrobei* subsp. *latrobei*, *Eriachne mucronata*, *Lepidium pedicellosum*, *Gomphrena cunninghamii*, *Hibiscus coatesii*, *Notoleptopus decaisnei* var. *orbicularis*, *Oldenlandia crouchiana*, *Paspalidium clementii*, *Ptilotus obovatus*, *Polycarpaea longiflora*, *Ptilotus schwartzii* var. *schwartzii*, *Scaevola acacioides*, *Senna glutinosa* ssp. *glutinosa*, *Senna glutinosa* subsp. *glutinosa* x *stricta*, *S. glutinosa* ssp. x *luerssenii*, *S. stricta*, *Tribulus suberosus*, *Triumfetta clementii*.

Quadrat /relevés: 1RA06, 1RA08, 1RA17, 1RA25, 1RA26, 1RA27, 1RA35  
 Land System: Cheela, Newman and Rocklea  
 Total Area HRA: 66.7 ha (4.9 %)  
 Total Area HGP: 0 ha  
 Condition: Excellent

**Hi09** Acacia aptaneura, A. pruinocarpa low open woodland to low woodland over Eremophila cryptothrix, Eremophila latrobei subsp. latrobei scattered shrubs to open shrubland over Triodia wiseana scattered hummock grasses to open hummock grassland.

This vegetation occurs on top of the southern most deposit of the HRA in shallow soils. Associated species include *Acacia marramamba*, *A. rhodophloia*, *Amyema fitzgeraldii*, *Cucumis maderaspatanus*, *Cymbopogon ambiguus*, *Cyperus cunninghamii* subsp. *cunninghamii*, *Dodonaea petiolaris*, *Eremophila cuneifolia*, *E. exilifolia*, *E. latrobei* subsp. *glabra*, *E. latrobei* subsp. *latrobei*, *Eriachne mucronata*, *Grevillea berryana*, *Oldenlandia crouchiana*, *Gomphrena cunninghamii*, *Paspalidium clementii*, *Ptilotus auriculifolius*, *P. calostachyus*, *P.*

*clementii*, *P. fusiformis*, *P. obovatus*, *P. schwartzii* var. *schwartzii*, *Senna glutinosa* subsp. *glutinosa*, *S. glutinosa* subsp. *x luerssenii*, *Solanum gabrielae*, *S. horridum*, *Trachymene oleracea* subsp. *oleracea*, *T. pilbarensis*, *Tribulus suberosus*.

Quadrat /relevés: 1RA20, 1RA22, 1RA23  
 Land System: Rocklea  
 Total Area HRA: 33.5 ha (2.5 %)  
 Total Area HGP: 0 ha  
 Condition: Excellent

**Hi14** *Acacia rhodophloia*, *A. aptaneura* tall open shrubland over *Senna glutinosa* subsp. *glutinosa*, *Eremophila latrobei* subsp. *latrobei* over *Triodia wiseana* open hummock grassland.

This vegetation occurs in shallow soils on top of the southernmost deposit in the HRA. Associated species include *Acacia maitlandii*, *A. marramamba*, *A. synchronicia*, *A. tetragonophylla*, *Amyema fitzgeraldii*, *Bulbostylis barbata*, *Cucumis maderaspatanus*, *Cymbopogon ambiguus*, *C. obtectus*, *Dodonaea petiolaris*, *Eremophila cryptothrix*, *E. cuneifolia*, *E. fraseri* subsp. *fraseri*, *E. latrobei* subsp. *latrobei*, *Eriachne mucronata*, *Gomphrena cunninghamii*, *Grevillea berryana*, *Oldenlandia crouchiana*, *Paspalidium clementii*, *Polycarpha longiflora*, *Ptilotus fusiformis*, *Scaevola acacioides*, *Senna glutinosa* subsp. *glutinosa*, *S. glutinosa* subsp. *x luerssenii*, *Trachymene pilbarensis*, *Triodia angusta*.

Quadrat /relevés: 1RA21, 1RA24  
 Land System: Rocklea  
 Total Area HRA: 1.6 ha (0.1 %)  
 Total Area HGP: 0 ha  
 Condition: Excellent

**Hi16** *Acacia pruinocarpa* scattered low trees to low woodland over *Acacia marramamba* scattered shrubs over *Triodia wiseana* hummock grassland.

This vegetation occurs in shallow soils on the northern deposit in the HRA. Associated species include *Acacia hamersleyensis*, *Codonocarpus cotinifolius*, *Cucumis maderaspatanus*, *Cymbopogon ambiguus*, *Dysphania rhadinostachya* subsp. *rhadinostachya*, *Eriachne mucronata*, *E. pulchella* subsp. *dominii*, *Eucalyptus leucophloia* subsp. *leucophloia*, *Gomphrena cunninghamii*, *Oldenlandia crouchiana*, *Paspalidium clementii*, *Polycarpha longiflora*, *Ptilotus clementii*, *P. exaltatus* var. *exaltatus*, *P. fusiformis*, *P. obovatus*, *Scaevola acacioides*, *S. artemisioides* subsp. *helmsii*, *S. artemisioides* subsp. *oligophylla*, *S. glutinosa* subsp. *pruinosa*, *Solanum gabrielae*, *Stylobasium spathulatum*, *Tribulus suberosus*, *Tripogon loliiformis*.

Quadrat /relevés: 1RA30, 1RA31, 1RA32, 1RA33  
 Land System: Newman and Rocklea  
 Total Area HRA: 33.4 ha (2.5 %)  
 Total Area HGP: 0 ha  
 Condition: Excellent

**Hi19** *Eucalyptus leucophloia* subsp. *leucophloia* and *Acacia pruinocarpa* scattered low trees to low open woodland over *A. marramamba* and *A. spondylophylla* scattered shrubs to open heath over *Triodia wiseana* hummock grassland.

This vegetation occurs in shallow soils on top of the western most deposit in the HRA. Associated species include *Acacia maitlandii*, *Bulbostylis barbata*, *Cymbopogon ambiguus*, *Dysphania rhadinostachya* subsp. *rhadinostachya*, *Eremophila latrobei* subsp. *glabra*, *Eriachne mucronata*, *Eriachne pulchella* subsp. *dominii*,

*Gomphrena cunninghamii*, *Indigofera monophylla*, *Mollugo molluginea*, *Oldenlandia crouchiana*, *Paspalidium clementii*, *Polycarpha longiflora*, *Ptilotus clementii*, *P. exaltatus* var. *exaltatus*, *P. fusiformis*, *Scaevola acacioides*, *Senna glutinosa* subsp. *glutinosa*, *Solanum ashbyae*, *S. gabriellae*, *Tribulus suberosus*, *Triumfetta clementii*.

Quadrat /relevés: 1RA12, 1RA13, 1RA36, 1RA40, 3RAr03,  
 Land System: Newman, River and Rocklea  
 Total Area HRA: 42.4 ha (3.1 %)  
 Total Area HGP: 0 ha  
 Condition: Excellent

**Hi22** *Eucalyptus leucophloia* subsp. *leucophloia* and / or *Corymbia ferriticola* scattered low trees over *Dodonaea pachyneura*, *Eremophila latrobei* subsp. *latrobei* scattered shrubs to open shrubland over *Triodia wiseana* scattered hummocks to open hummock grassland and *Eriachne mucronata* scattered tussock grasses.

This vegetation is associated with rocky overhangs and breakaways in the HRA. Associated species include *Acacia hamersleyensis*, *A. maitlandii*, *A. marramamba*, *A. pruinocarpa*, *A. tetragonophylla*, *A. rhodophloia*, *Astrotricha hamptonii*, *Clerodendrum floribundum* var. *angustifolium*, *Cucumis maderaspatanus*, *Cymbopogon ambiguus*, *Cyperus cunninghamii* subsp. *cunninghamii*, *Ficus brachypoda*, *Gomphrena cunninghamii*, *Grevillea berryana*, *Lobelia heterophylla* subsp. *pilbarensis*, *Nicotiana benthamiana*, *Oldenlandia crouchiana*, *Scaevola acacioides*, *Sauropus crassifolius*, *Senna glutinosa* subsp. *glutinosa*, *Trachymene oleracea* subsp. *oleracea*, *Trachymene pilbarensis*, *Triumfetta clementii*.

Quadrat /relevés: 1RA11, 1RA19 , 3RAr02, 3RAr04  
 Land System: Newman and Rocklea  
 Total Area HRA: 19.2 ha (1.4 %)  
 Total Area HGP: 0 ha  
 Condition: Excellent

**HBr4** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.

This vegetation is associated with the rolling hills in the northern, southern and eastern parts of the HRA. Associated species include *Acacia pyrifolia* var. *pyrifolia*, *A. synchronicia*, *A. tetragonophylla*, *Aristida contorta*, *Bonamia media* var. *villosa*, *Brachyachne prostrata*, *Bulbostylis barbata*, *Corchorus laniflorus*, *Dysphania rhadinostachya* subsp. *rhadinostachya*, *Enneapogon lindleyanus*, *E. polyphyllus*, *Eremophila cuneifolia*, *Heliotropium heteranthum*, *Eriachne pulchella* subsp. *dominii*, *Evolvulus alsinoides* var. *villosicalyx*, *Gomphrena cunninghamii*, *Iseilema eremaeum*, *Iseilema membranaceum*, *Oldenlandia crouchiana*, *Paspalidium clementii*, *Ptilotus exaltatus* var. *exaltatus*, *Salsola tragus* subsp. *tragus*, *Senna glutinosa* subsp. *glutinosa*, *S. glutinosa* subsp. *pruinosa*, *S. glutinosa* subsp. *x luerssenii*, *Sida echinocarpa*, *Sporobolus australasicus*, *Tribulus suberosus*, *Triumfetta clementii*.

Quadrat /relevés: 1RA02, 2RA07, 2RA08, 2RA10, 2RA12, 2RA13, 2RA17, 2RA22, 1RA28, 1RA29,  
 1RA37, 1RA38, 1RA45, 2RAr06  
 Land System: Rocklea  
 Total Area HRA: 724.7 ha (53.1%)  
 Total Area HGP: 0 ha  
 Condition: Excellent

**HBr25** Triodia wiseana hummock grassland.

This vegetation occurs on low stony rises and hills throughout the Survey Area. Associated species include *Acacia arida*, *A. inaequilatera*, *A. synchronicia*, *A. tetragonophylla*, *A. trudgeniana*, *Boerhavia coccinea*, *Cleome viscosa*, *Corchorus laniflorus*, *Dysphania rhadinostachya* subsp. *rhadinostachya*, *Enneapogon polyphyllus*, *Eremophila cuneifolia*, *Hakea lorea* subsp. *lorea*, *Oldenlandia crouchiana*, *Ptilotus auriculifolius*, *Ptilotus clementii*, *Ptilotus obovatus*, *Ptilotus calostachyus*, *Salsola tragus* subsp. *tragus*, *Senna artemisioides* subsp. *oligophylla*, *S. glutinosa* subsp. *glutinosa*, *S. glutinosa* subsp. *pruinosa*, *S. glutinosa* subsp. *x luerssenii*, *Solanum lasiophyllum*, *Trachymene oleracea* subsp. *oleracea*, *Tribulus hirsutus*, *Triumfetta clementii*.

Quadrat /relevés: Representative survey sites occur within the HRC and HBP Survey Area.

Land System: Capricorn

Total Area HRA: 0 ha

Total Area HGP: 6.6 ha (1.0%)

Condition: Excellent

**Plains****PI07** Acacia xiphophylla scattered low trees to low woodland over Eremophila cuneifolia scattered shrubs to open shrubland over Triodia epactia scattered hummock grasses and \*Cenchrus ciliaris scattered tussock grasses.

This vegetation occurs on gently undulating gibber plains in the northern part of the HGP. This part of the HGP abuts the HRC and representative survey sites were sampled as part of that survey (Astron 2011a). Associated species are inferred for the HGP based on the results of the HRC survey and include *Acacia synchronicia*, *A. tetragonophylla*, *Boerhavia coccinea*, *Brachyachne prostrata*, *Dactyloctenium radulans*, *Enchylaena tomentosa* var. *tomentosa*, *Enneapogon polyphyllus*, *Enteropogon ramosus*, *Eremophila latrobei* subsp. *filiformis*, *Eriachne pulchella* subsp. *pulchella*, *Evolvulus alsinoides* var. *villosicalyx*, *Grevillea berryana*, *Maireana melanocoma*, *M. tomentosa* subsp. *tomentosa*, *Psydrax latifolia*, *Ptilotus exaltatus* var. *exaltatus*, *P. obovatus*, *Rhagodia eremaea*, *Sclerolaena densiflora*, *S. eriantha*, *Senna artemisioides* subsp. *helmsii*, *S. artemisioides* subsp. *oligophylla*, *S. artemisioides* subsp. *oligophylla x helmsii*, *S. glutinosa* subsp. *glutinosa x stricta*, *S. sp. Meekatharra*, *S. stricta*, *Sporobolus australasicus*, *Tragus australianus*.

Quadrat /relevés: Representative survey sites occur within the HRC and HBP Survey Area.

Land System: Capricorn, River and Paraburdoo

Total Area HRA: 0

Total Area HGP: 26.5 ha (4.2 %)

Condition: Excellent

**PI08** Acacia xiphophylla (A. aptaneura) low open woodland to low woodland over Senna spp., Eremophila cuneifolia scattered shrubs to open shrubland over Triodia wiseana scattered hummock grasses to open hummock grassland.

This vegetation occurs on stony plains in the southern part of the HRA. Associated species include *Abutilon fraseri*, *Acacia. synchronicia*, *A. tetragonophylla*, *Aristida contorta*, *Boerhavia coccinea*, *Brachyachne prostrata*, *Dactyloctenium radulans*, *Duperreya commixta*, *Enchylaena tomentosa* var. *tomentosa*, *Enneapogon caeruleus*, *E. polyphyllus*, *Enteropogon ramosus*, *Gomphrena kanisii*, *Maireana georgei*, *M. melanocoma*, *M. tomentosa* subsp. *tomentosa*, *M. villosa*, *Polycarpaea corymbosa*, *\*Portulaca oleracea*, *Ptilotus aevoides*, *P. exaltatus* var. *exaltatus*, *P. obovatus*, *Rhagodia eremaea*, *Salsola tragus* subsp. *tragus*, *Scaevola spinescens*, *Sclerolaena densiflora*, *S. eriantha*, *Senna artemisioides* subsp. *oligophylla*, *S. artemisioides* subsp. *oligophylla x helmsii*, *S. glutinosa* subsp. *x luerssenii*, *S. stricta*, *Solanum lasiophyllum*, *Tripogon loliiformis*, *Triumfetta clementii*.

Quadrat /relevés: 1RA03

Land System: Newman and Rocklea  
 Total Area HRA: 9.6 ha (0.7 %)  
 Total Area HGP: 0 ha  
 Condition: Excellent

**PI10** *Acacia xiphophylla* (*A. tetragonophylla* and / or *A. synchronicia*) low open woodland to low woodland over *Senna* spp., *Eremophila cuneifolia* scattered shrubs over *Triodia wiseana* scattered hummock grasses.

This vegetation occurs on narrow stony plains in the HRA. Associated species include *Abutilon fraseri*, *Aristida contorta*, *Boerhavia coccinea*, *Brachyachne prostrata*, \**Cenchrus ciliaris*, *Dactyloctenium radulans*, *Enchylaena tomentosa* var. *tomentosa*, *Enteropogon ramosus*, *Eremophila forrestii* subsp. *forrestii*, *Eriachne pulchella* subsp. *pulchella*, *Iseilema membranaceum*, *Maireana melanocoma*, *M. villosa*, \**Portulaca oleracea*, *Ptilotus exaltatus* var. *exaltatus*, *P. obovatus*, *Rhagodia eremaea*, *Salsola tragus* subsp. *tragus*, *Scaevola spinescens*, *Sclerolaena densiflora*, *S. eriacantha*, *Senna glutinosa* subsp. *x luerssenii*, *S. glutinosa* subsp. *glutinosa* x *stricta*, *S. sp.* Meekatharra, *S. stricta*, *Sporobolus australasicus*, *Trianthema glossostigma*, *Tripogon loliiiformis*.

Quadrat /relevés: 2RA01, 6RAr01  
 Land System: Newman and Rocklea  
 Total Area HRA: 78.4 ha (5.7 %)  
 Total Area HGP: 1.0 ha (0.2 %)

Condition: Excellent

**PI11** *Acacia xiphophylla* (*A. tetragonophylla* and / or *A. synchronicia*) low open woodland over *Eremophila cuneifolia* scattered shrubs.

This vegetation occurs on gibber plains in the HGP. Associated species include *Aristida contorta*, *Atriplex codonocarpa*, *Boerhavia coccinea*, *Brachyachne prostrata*, *Bulbostylis barbata*, \**Cenchrus ciliaris*, *Dactyloctenium radulans*, *Enchylaena tomentosa* var. *tomentosa*, *Enteropogon ramosus*, *Eriachne pulchella* subsp. *pulchella*, *Frankenia hispidula*, *Heliotropium heteranthum*, *Maireana planifolia*, *M. thesioides*, *M. villosa*, *Rhagodia eremaea*, *Salsola tragus* subsp. *tragus*, *Scaevola spinescens*, *Sclerolaena cuneata*, *S. densiflora*, *S. eriacantha*, *Senna glutinosa* subsp. *x luerssenii*, *S. sp.* Meekatharra, *S. stricta*, *Tragus australianus*, *Trianthema glossostigma*, *T. triquetra*, *Tribulus suberosus*.

Quadrat /relevés: 1GP06, 1GPr04, 2GPr01, 1GPr12  
 Land System: Newman  
 Total Area HRA: 0  
 Total Area HGP: 89.7 ha (14.2 %)  
 Condition: Excellent

## Major Drainage

**Ma01** *Eucalyptus camaldulensis* subsp. *obtusata*, *E. victrix* open woodland to woodland over *Melaleuca glomerata* tall open shrubland over \**Cenchrus ciliaris* very open tussock grassland to tussock grassland.

This vegetation occurs along the main flow channel and lower banks of the Hardey River. Associated species include \**Acetosa vesicaria*, *Acacia coriacea* subsp. *pendens*, *A. pyrifolia* var. *pyrifolia*, *A. synchronicia*, *Ammannia multiflora*, \**Argemone ochroleuca* subsp. *ochroleuca*, \**Citrullus colocynthis*, *Convolvulus angustissimus* subsp. *angustissimus*, *Corchorus crozophorifolius*, *Crotalaria cunninghamii* subsp. *sturtii*, *C. medicaginea* var. *neglecta*, *Cucumis maderaspatanus*, *Euphorbia alsiniflora*, \**E. hirta*, *Hybanthus aurantiacus*, *Ipomoea muelleri*, *Petalostylis labicheoides*, *Pluchea rubelliflora*, *Pterocaulon sphaeranthoides*, *Sesbania*

*cannabina*, *Streptoglossa bubakii*, *Stemodia grossa*, *Tephrosia rosea* var. *glabrior*.

Quadrat /relevés: 2RA05  
 Land System: River  
 Total Area HRA: 1.7 ha (0.1 %)  
 Total Area HGP: 0 ha  
 Condition: Poor

**Ma03** *Acacia citrinoviridis* (*Eucalyptus victrix* and / or *Eucalyptus leucophloia* subsp. *leucophloia*) low open woodland over *Petalostylis labicheoides*, *Stylobasium spathulatum*, *A. bivenosa* tall shrubland over *Triodia angusta*, *T. wiseana* very open hummock grassland and \**Cenchrus ciliaris* scattered tussock grasses.

This vegetation occurs along moderately sized tributaries of the Hardey River throughout the HRA. Associated species include *Abutilon dioicum*, *Acacia pyrifolia* var. *pyrifolia*, *A. synchronicia*, *A. tetragonophylla*, \**Acetosa vesicaria*, \**Aerva javanica*, \**Citrullus colocynthis*, *Corchorus tridens*, *C. crozophorifolius*, *Crotalaria medicaginea* var. *neglecta*, *Eremophila longifolia*, *Euphorbia biconvexa*, \**Flaveria trinervia*, *Gomphrena canescens*, *Gossypium australe*, *G. robinsonii*, *Hybanthus aurantiacus*, *Hibiscus sturtii* var. *platyklamys*, *Indigofera monophylla*, *Jasminum didymum*, subsp. *lineare*, *Notoleptopus decaisnei* var. *orbicularis*, *Pluchea dentex*, *Pterocaulon sphaeranthoides*, *Rhynchosia minima*, *Senna artemisioides* subsp. *oligophylla*, *S. glutinosa* subsp. *glutinosa*, *S. glutinosa* subsp. x *luerssenii*, *Stylobasium spathulatum*, *Tephrosia rosea* var. *glabrior*, *Triodia angusta*, *Waltheria indica*, *Zaleya galericulata* subsp. *galericulata*.

Quadrat /relevés: 1RA04, 1RA05, 1RA09, 1RA14b, 2RAr09, 2RAr14  
 Land System: Newman and Rocklea  
 Total Area HRA: 72.0 ha (5.3 %)  
 Total Area HGP: 0 ha  
 Condition: Good-Fair

**Ma04** *Melaleuca glomerata* low closed forest over *Streptoglossa decurrens* and *Pluchea rubelliflora* herbland.

This vegetation occurs as restricted stands within a drainage line that runs through the centre of the HRA. It appears to be associated with high ground water table as the site surveyed was saturated at the time of the Phase 2 survey. Associated species include *Acacia bivenosa*, *A. citrinoviridis*, *A. coriacea* subsp. *pendens*, \**Bidens bipinnata*, \**Citrullus colocynthis*, *C. crozophorifolius*, *Corchorus tridens*, *Crotalaria medicaginea* var. *neglecta*, *Cyperus vaginatus*, *Eragrostis tenellula*, *Eremophila longifolia*, *Gossypium australe*, *G. robinsonii*, *Helichrysum luteoalbum*, *Jasminum didymum*, subsp. *lineare*, \* *Malvastrum americanum*, *Notoleptopus decaisnei* var. *orbicularis*, *Pterocaulon sphaeranthoides*, *Rhynchosia minima*, *Senna artemisioides* subsp. *oligophylla*, \**Sonchus oleraceus*, *Stylobasium spathulatum*, *Tephrosia rosea* var. *glabrior*.

Quadrat /relevés: 2RAr15  
 Land System: Rocklea  
 Total Area HRA: 2.1 ha (0.2 %)  
 Total Area HGP: 0 ha  
 Condition: Excellent

## Minor Drainage

**Mi02** *Acacia citrinoviridis*, *A. coriacea* subsp. *pendens* (*Melaleuca glomerata*) low open forest over

Triodia wiseana very open hummock grassland and mixed spp. scattered tussock grasses.

This vegetation occurs on narrow to moderately wide creeks in the northern and central parts of the HRA. The density of *Melaleuca glomerata* varies, and it forms dense thickets near natural springs. Associated species include *Abutilon dioicum*, *A. tetragonophylla*, *\*Aerva javanica*, *Amaranthus undulatus*, *\*Bidens bipinnata*, *Clerodendrum floribundum* var. *angustifolium*, *C. tomentosum* var. *lanceolatum*, *Convolvulus clementii*, *Corchorus crozophorifolius*, *C. tridens*, *Crotalaria medicaginea* var. *neglecta*, *Cucumis maderaspatanus*, *Cymbopogon ambiguus*, *Cyperus vaginatus*, *Duperreya commixta*, *Eremophila longifolia*, *\*Flaveria trinervia*, *Helichrysum luteoalbum*, *Hybanthus aurantiacus*, *Indigofera monophylla*, *Jasminum didymum* subsp. *lineare*, *Melhania oblongifolia*, *Nicotiana occidentalis*, *Paspalidium clementii*, *Pluchea rubelliflora*, *Pterocaulon sphaeranthoides*, *Rhynchosia minima*, *Senna artemisioides* subsp. *helmsii*, *S. artemisioides* subsp. *oligophylla*, *S. glutinosa* subsp. *glutinosa* *\*Setaria verticillata*, *Streptoglossa decurrens*, *Tephrosia rosea* var. *glabrior*, *Themeda triandra*.

Quadrat /relevés: 2RA18, 2RAr15, 2RAr20, 2RAr21

Land System: Rocklea

Total Area HRA: 36.8 ha (2.7 %)

Total Area HGP: 0 ha

Condition: Good-Fair

**Mi05** *Acacia aptaneura*, *A. citrinoviridis*, *A. kempeana* low open woodland to low open forest over *\*Cenchrus ciliaris* scattered tussock grasses to open tussock grassland and *Triodia wiseana* and / or *T. epactia* scattered hummock grasses to open hummock grassland.

This vegetation occurs along a moderately wide unnamed tributary of the Hardey River in the northern part of the HGP. This part of the Survey Area abuts the HRC and survey sites were sampled from this vegetation association as part of the HRC survey (Astron 2011). Associated species are inferred from the HRC and include *Abutilon* aff. *lepidum*, *A. fraseri*, *Acacia tetragonophylla*, *Amaranthus cuspidifolius*, *\*Bidens bipinnata*, *Blumea tenella*, *Cheilanthes sieberi* subsp. *sieberi*, *Chrysopogon fallax*, *Corchorus crozophorifolius*, *C. tridens*, *Corymbia hamersleyana*, *Cucumis maderaspatanus*, *Dicladantha forrestii*, *Duperreya commixta*, *Eragrostis setifolia*, *Glycine canescens*, *Grevillea berryana*, *Hibiscus* aff. *coatesii*, *Hybanthus aurantiacus*, *\*Malvastrum americanum*, *Notoleptopus decaisnei* var. *orbicularis*, *Polycarpaea corymbosa*, *P. longiflora*, *Ptilotus obovatus*, *Rhynchosia minima*, *Senna artemisioides* subsp. *oligophylla*, *Sida* sp. spiciform panicles, *S. sp. verrucose glands*.

Quadrat /relevés: Representative survey sites occur within the HRC and HBP Survey Area.

Land System: Paraburdoo

Total Area HRA: 0 ha

Total Area HGP: 6.3 ha (1.0 %)

Condition: Excellent

**Mi06** *Acacia citrinoviridis* low open woodland to low open forest over *\*Cenchrus ciliaris* open tussock grassland to tussock grassland and *Triodia wiseana* scattered hummock grasses.

This vegetation occurs in moderately wide creeks and floodplains in the HRA. Due to the high density of *\*Cenchrus ciliaris*, this vegetation has a limited suite of associated species. Associated species include *Acacia coriacea* subsp. *pendens*, *A. kempeana*, *A. pyriformis* var. *pyriformis*, *A. tetragonophylla*, *Amaranthus undulatus*, *Boerhavia coccinea*, *Corchorus crozophorifolius*, *C. laniflorus*, *Cucumis maderaspatanus*, *Dicladantha forrestii*, *Duperreya commixta*, *Enchylaena tomentosa* var. *tomentosa*, *Gossypium australe*, *Hybanthus aurantiacus*, *Jasminum didymum* subsp. *lineare*, *Notoleptopus decaisnei* var. *orbicularis*, *Phyllanthus maderaspatensis*, *Polycarpaea longiflora*, *Pterocaulon sphaeranthoides*, *Rhagodia eremaea*, *Rhynchosia minima*, *Salsola tragus* subsp. *tragus*, *Senna artemisioides* subsp. *oligophylla*, *Stemodia grossa*, *Tephrosia rosea* var. *glabrior*, *Themeda triandra*.



Quadrat /relevés:	2RA11, 1GP02
Land System:	Rocklea
Total Area HRA:	20.1 ha (1.5 %)
Total Area HGP:	76.3 ha (12.0 %)
Condition:	Good-Fair

**Mi08** *Acacia citrinoviridis*, *A. aptaneura* low woodland to low open forest over *Triodia wiseana* scattered hummock grasses to hummock grassland and \**Cenchrus ciliaris* scattered tussock grasses to tussock grassland.

This vegetation occurs along moderately wide tributaries of the Hardey River. Associated species include *Acacia tetragonophylla*, *Amaranthus undulatus*, \**Bidens bipinnata*, \**Cenchrus setiger*, *Corchorus crozophorifolius*, *C. tridens*, *Crotalaria medicaginea* var. *neglecta*, *Cucumis maderaspatanus*, *Duperreya commixta*, *Eremophila cuneifolia*, *E. forrestii*, *Euphorbia tannensis* subsp. *eremophila*, \**Flaveria trinervia*, *Glycine canescens*, *Goodenia forrestii*, *G. tenuiloba*, *Jasminum didymum* subsp. *lineare*, \**Malvastrum americanum*, *Melaleuca glomerata*, *Notoleptopus decaisnei* var. *orbicularis*, *Oldenlandia crouchiana*, *Paspalidium clementii*, *Pterocaulon sphaeranthoides*, *Rhyncharrhena linearis*, *Rhynchosia minima*, *Senna glutinosa* subsp. *x luerssenii*.

Quadrat /relevés:	1RA46, 2RAr03
Land System:	Newman and Rocklea
Total Area HRA:	31.5 ha (2.3 %)
Total Area HGP:	0.5 ha (0.1 %)
Condition:	Excellent

**Mi12** *Acacia kempeana*, *A. wanyu* tall open shrubland to tall shrubland over \**Cenchrus ciliaris* scattered tussock grasses to very open tussock grassland and *Triodia epactia* and / or *T. wiseana* scattered hummock grasses to open hummock grassland.

This vegetation occurs on shallow drainage tracts and depressions throughout the Survey Area. Associated species include *Abutilon* aff. *lepidum*, *Acacia pruinocarpa*, *A. tetragonophylla*, *Alternanthera nana*, *Alysicarpus muelleri*, *Amaranthus undulatus*, \**Bidens bipinnata*, *Chrysopogon fallax*, *Convolvulus clementii*, *Corchorus laniflorus*, *C. tridens*, *Crotalaria medicaginea* var. *neglecta*, *Cucumis maderaspatanus*, *Dodonaea petiolaris*, *Evolvulus alsinoides* var. *villosicalyx*, *Grevillea berryana*, *Hibiscus gardneri*, *H. sturtii* var. *grandiflorus*, \**Malvastrum americanum*, *Melhania oblongifolia*, *Paspalidium clementii*, *Polycarpaea corymbosa*, *Pterocaulon sphaeranthoides*, *Ptilotus obovatus*, *Rhyncharrhena linearis*, *Rhynchosia minima*, *Senna artemisioides* subsp. *oligophylla*.

Quadrat /relevés:	Representative survey sites occur within the HRC and HBP Survey Area.
Land System:	Cheela
Total Area HRA:	0 ha
Total Area HGP:	3.8 ha (0.6 %)
Condition:	Excellent

**Mi15** *Acacia aptaneura* and *A. kempeana* low open woodland to low closed forest over *Triodia wiseana* and / or *T. epactia* open hummock grassland to hummock grassland and \**Cenchrus ciliaris* scattered tussock grasses to open tussock grassland.

This vegetation occurs along a shallow drainage tract in the north of the HGP alignment. Associated species

include *Acacia synchronicia*, *A. tetragonophylla*, *Amaranthus cuspidifolius*, *Cheilanthes sieberi* subsp. *sieberi*, *Digitaria ctenantha*, *Dodonaea petiolaris*, *Eremophila cuneifolia*, *E. forrestii* var. *forrestii*, *Goodenia tenuiloba*, *Grevillea berryana*, *Hibiscus burtonii*, *H. sturtii* var. *campylochlamys*, *Jasminum didymum* subsp. *lineare*, *Notoleptopus decaisnei* var. *orbicularis*, *Perotis rara*, *Polycarpaea corymbosa*, *Ptilotus obovatus*, *Santalum lanceolatum*, *Senna glutinosa* subsp. x *luerssenii*, *Sida fibulifera*, *Tragus australianus*, *Yakirra australiensis*.

Quadrat /relevés: 1GPr01  
 Land System: Newman  
 Total Area HRA: 0 ha  
 Total Area HGP: 20.0 ha (3.2 %)  
 Condition: Poor

**mDr32** *Acacia synchronicia*, *A. citrinoviridis* open shrubland to shrubland over \**Cenchrus ciliaris* tussock grassland.

This vegetation occurs in association with broad outwash areas and floodplains associated with the Hardey River in the HGP and eastern part of the HRA. Associated species include *Acacia kempeana*, *A. tetragonophylla*, *Boerhavia coccinea*, \**Cenchrus setiger*, *Codonocarpus cotinifolius*, *Corchorus tridens*, *Dactyloctenium radulans*, *Eragrostis eriopoda*, *Eremophila fraseri* subsp. *fraseri*, *E. forrestii* ?subsp., *Indigofera colutea*, *Ptilotus aevroides*, *P. obovatus*, *Rhagodia eremaea*, *Salsola tragus* subsp. *tragus*, *Scaevola spinescens*, *Sclerolaena costata*, *Senna artemisioides* subsp. *oligophylla*, *Sida fibulifera*, *Sporobolus australasicus*, *Triodia wiseana*.

Quadrat /relevés: 2RA02, 2GPr02, 2RAr04, 1GP03, 1GP10, 1GPr08  
 Land System: Cheela, Newman and Rocklea  
 Total Area HRA: 37.1 ha (2.7 %)  
 Total Area HGP: 403.1 ha (63.6 %)  
 Condition: Good-Fair

**mDr36** *Eucalyptus camaldulensis* subsp. *obtusa* woodland over *Melaleuca glomerata* (*A. citrinoviridis*) low open forest over \**Cenchrus setiger* and \**C. ciliaris* tussock grassland.

This vegetation occurs along the edge of the Hardey River in the southern part of the HRA, south of the Nanutarra – Paraburdoo Road. Associated species include *Acacia coriacea* subsp. *pendens*, *A. synchronicia*, \**Acetosa vesicaria*, \**Aerva javanica*, *Ammannia multiflora*, \**Argemone ochroleuca* subsp. *ochroleuca*, *Boerhavia repleta*, *Corchorus tridens*, *Cucumis maderaspatanus*, *Eragrostis tenellula*, \**Euphorbia biconvexa*, *E. hirta*, *Jasminum didymum* subsp. *lineare*, \**Malvastrum americanum*, *Petalostylis labicheoides*, *Pluchea rubelliflora*, \**Sisymbrium orientale*, \**Sonchus oleraceus*, \**Stemodia grossa*, \**Vachellia farnesiana*

Quadrat /relevés: 2RA05  
 Land System: Rocklea  
 Total Area HRA: 14.2 ha (1.0 %)  
 Total Area HGP: 0 ha  
 Condition: Fair

### 3.2.3 Vegetation Condition

Vegetation condition in the Survey Area ranged from Poor to Excellent. In general, where vegetation structure is intact, the HRA is in Excellent Condition with few introduced species present, particularly in areas of higher topographical relief. However, due to the clearing of a number of additional tracks and drills pads, condition has declined between the Phase 1 and Phase 2 surveys in some parts, with the clearing of a number of additional tracks and drills pads.

Sites in poorer condition were generally associated with creeks and floodplains, in both the HRA and HGP. These areas had a higher density and richness of introduced species, particularly \**Cenchrus ciliaris* (Buffel Grass), and evidence of heavy grazing. Of 541 weed record points collected in the Survey Area, 257 of the locations sampled (47.5 %) had no introduced flora associated with them (absence records). Weed species are further discussed in Section 3.2.7

It has been at least ten years since any fires were recorded in the Survey Area (Landgate 2011) and vegetation structure is generally intact. The total proportion of the Survey Area attributed with each condition rating recorded during the Phase 2 surveys is presented in Table 15. Vegetation condition mapping including introduced flora locations are presented in Appendix K.

**Table 15: Proportion of Survey Area attributed with each condition rating.**

Condition Rating	Proportion of HRA (%)	Proportion of HGP (%)
Excellent	97.5	73.7
Good	0	3.2
Good – Fair	0.7	7.1
Fair	1.6	5.1
Poor	0.2	10.8
Completely Degraded	0	0

### 3.2.4 Vegetation of Conservation Significance

#### 3.2.4.1 Threatened Ecological Communities and Priority Ecological Communities.

No TECs or PECs were recorded within the Survey Area.

### 3.2.5 Vegetation of Interest

#### 3.2.5.1 Ecosystems 'At Risk' or of High Reservation Priority

All major ephemeral water courses are described as 'at risk' and Vulnerable in the Hamersley subregion (Kendrick 2001a). Of the vegetation associations recorded in the Survey Area, vegetation associations Ma01 and Ma03 are considered to be analogous to this ecosystem and occur over a combined area of 73.7 ha or 5.4 % of the HRA (Table 16). Neither vegetation association was recorded in the HGP.

Valley floor Mulga is also listed as Vulnerable and is considered analogous to the vegetation association PI08, which occurs over 9.6 ha (0.7 %) of the HRA (not recorded in the HGP). Hill-top floras, Hamersley Range is also listed as Vulnerable and is considered analogous to Hi22 in the Survey Area, covering a total of 19.2 ha (1.4 %) of the HRA (not recorded in the HGP).

In the Ashburton subregion, Mulga creekline communities of the Ashburton alluvial plains are listed as 'at risk' but not given a status rating. This ecosystem is considered analogous to vegetation

association Mi08 in the HRA and Mi15 in the HGP, with a total area of 31.5 ha (2.3 %), and 20.0 ha (3.2 %), respectively.

The survey area includes five vegetation associations mapped by Beard (1975) (Appendix A). Four of the Beard vegetation associations (82, 160, 162, and 181) are considered analogous to vegetation associations described in this survey. The four vegetation associations described by Beard (1975) are of High or Medium priority for reservation in the conservation estate in the Hamersley and / or Ashburton subregion. The total proportion of each of these vegetation associations considered analogous to those described by Beard (1975) are provided in Table 17.

Table 16: Ecosystems 'At Risk' (Kendrick 2001a; Kendrick 2001b) and analogous vegetation associations recorded in the Survey Area.

Ecosystem description	IBRA subregion	Status	Analogous Vegetation Association Code	Analogous Vegetation Association Description	Area within HRA (ha)	Proportion of HRA (%)	Area within HGP (ha)	Proportion of HGP (%)
All major ephemeral water courses	Hamersley	Vulnerable	Ma01	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i> , <i>E. victrix</i> open woodland to woodland over <i>Melaleuca glomerata</i> tall open shrubland over * <i>Cenchrus ciliaris</i> very open tussock grassland to tussock grassland.	1.7	0.1	0	0
			Ma03	<i>Acacia citrinoviridis</i> ( <i>Eucalyptus victrix</i> and / or <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ), low open woodland over <i>Petalostylis labicheoides</i> , <i>Stylobasium spathulatum</i> , <i>A. bivenosa</i> tall shrubland over <i>Triodia angusta</i> , <i>T. wiseana</i> very open hummock grassland and * <i>Cenchrus ciliaris</i> scattered tussock grasses.	72.0	5.3	0	0
Hill-top floras, Hamersley Range	Hamersley	Vulnerable	Hi22	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and / or <i>Corymbia ferritcola</i> scattered low trees over <i>Dodonaea pachyneura</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> scattered shrubs to open shrubland over <i>Triodia wiseana</i> scattered hummocks to open hummock grassland and <i>Eriachne mucronata</i> scattered tussock grasses.	19.2	1.4	0	0
Valley floor Mulga	Hamersley	Vulnerable	PI08	<i>Acacia xiphophylla</i> ( <i>A. aptaneura</i> ) low open woodland to low woodland over <i>Senna</i> spp., <i>Eremophila cuneifolia</i> scattered shrubs to open shrubland over <i>Triodia wiseana</i> scattered hummock grasses to open hummock grassland.	9.6	0.7	0	0
Mulga creekline community, alluvial plains of the Ashburton	Ashburton	Not listed	Mi08	<i>Acacia citrinoviridis</i> , <i>A. aptaneura</i> low woodland to low open forest over <i>Triodia wiseana</i> scattered hummock grasses to hummock grassland and * <i>Cenchrus ciliaris</i> scattered tussock grasses to tussock grassland.	31.5	2.3	0.5	0.1

Ecosystem description	IBRA subregion	Status	Analogous Vegetation Association Code	Analogous Vegetation Association Description	Area within HRA (ha)	Proportion of HRA (%)	Area within HGP (ha)	Proportion of HGP (%)
			Mi15	<i>Acacia aptaneura</i> and <i>A. kempeana</i> low open woodland to low closed forest over <i>T. wiseana</i> and/or <i>T. epactia</i> open hummock grassland to hummock grassland and * <i>Cenchrus ciliaris</i> scattered tussock grasses to open tussock grassland.	0	0	20.0	3.2

Table 17: Beard vegetation associations of reservation priority in the Survey Area (Kendrick 2001a and Kendrick 2001b).

Beard Ecosystem Code and Description (Beard 1975)	Reservation Priority Hamersley subregion (Kendrick 2001a and 2001b)	Reservation Priority Ashburton subregion	Analogous Vegetation Association					
			Code	Description	Area in HRA (ha)	Proportion of HRA (%)	Area in HGP (ha)	Proportion of HGP (%)
82: Hummock grasslands, low tree steppe; snappy gum ( <i>Eucalyptus leucophloia</i> ) over <i>Triodia wiseana</i> .	Low	Medium	Hi19	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Acacia pruinocarpa</i> scattered low trees to low open woodland over <i>A. marramamba</i> and <i>A. spondylophylla</i> scattered shrubs to open heath over <i>Triodia wiseana</i> hummock grassland.	42.4	3.1	0	0
160: Shrublands; snakewood and <i>A. victoriae</i> scrub.	High	High	PI10	<i>Acacia xiphophylla</i> ( <i>A. tetragonophylla</i> and / or <i>A. synchronica</i> ) low open woodland to low woodland over <i>Senna</i> spp., <i>Eremophila cuneifolia</i> scattered shrubs over <i>Triodia wiseana</i> scattered hummock grasses.	78.4	5.7	1.0	0.2
162: Shrublands; snakewood scrub	High	Medium	PI11	<i>Acacia xiphophylla</i> ( <i>A. tetragonophylla</i> and / or <i>A. synchronica</i> ) low open woodland over <i>Eremophila cuneifolia</i> scattered shrubs.	0	0	89.7	14.2
181: Shrublands; Mulga and snakewood scrub	Medium	High	PI08	<i>Acacia xiphophylla</i> ( <i>A. aptaneura</i> ) low open woodland to low woodland over <i>Senna</i> spp., <i>Eremophila cuneifolia</i> scattered shrubs to open shrubland over <i>Triodia wiseana</i> scattered hummock grasses to open hummock grassland.	9.6	0.7	0	0

Beard Ecosystem Code and Description	Reservation Priority Hamersley	Reservation Priority Ashburton	Analogous Vegetation Association					
567: Hummock grasslands, shrub steppe; Mulga & kanji over soft spinifex & <i>T. basedowii</i>	Low	Medium	N/A	No analogous vegetation association	-	-	-	-



### 3.2.5.2 Floristic Community Groups

Detailed results of the floristic assessment are provided in Appendix F. A total of 30 numerical, or Floristic Community Groups, were identified within the Survey Area. Of the 78 sites surveyed as part of the HRA and HGP, 14 did not group with any other sites in the Survey Area, although eight of these grouped with sites from the HRC and HBP survey (Astron 2011a). The six sites from the Survey Area that did not group with any other sites in the Project Area are listed in Table 18.

Table 18: Survey sites that did not group with another site from the Project Area.

Floristic Community Group	Survey Site	Vegetation Description
FCG63	1RA22	<i>Acacia aptaneura</i> (A. <i>pruinocarpa</i> ) tall open shrubland over <i>Maireana georgei</i> low open shrubland over <i>Triodia wiseana</i> open hummock grassland.
FCG64	1RA21	<i>Acacia rhodophloia</i> and <i>A. aptaneura</i> tall open shrubland over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Eremophila latrobei</i> and <i>Scaevola acacioides</i> open shrubland over <i>Triodia wiseana</i> open hummock grassland.
FCG65	1RA06	<i>Acacia aptaneura</i> low open forest over <i>Dodonaea petiolaris</i> and <i>Eremophila platycalyx</i> subsp. <i>pardalota</i> tall shrubland over <i>Ptilotus obovatus</i> scattered low shrubs over <i>Polycarpaea longiflora</i> very open herbland with <i>Triodia wiseana</i> very open hummock grassland.
FCG66	1RA26	<i>Acacia aptaneura</i> low open woodland over <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> and <i>S. glutinosa</i> subsp. <i>glutinosa</i> open shrubland over <i>S. stricta</i> low shrubland over <i>Triodia wiseana</i> open hummock grassland.
FCG69	1RA14b	<i>Acacia citrinoviridis</i> open scrub over <i>Eremophila cryptothrix</i> , <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>Stylobasium spathulatum</i> scrubland over mixed spp. open tussock grassland and <i>Triodia wiseana</i> , <i>Triodia angusta</i> hummock grassland.
FCG71	2RAr15	<i>Melaleuca glomerata</i> low closed forest over <i>Streptoglossa decurrens</i> and <i>Pluchea rubelliflora</i> herbland with <i>Cyperus vaginatus</i> scattered sedges with * <i>Setaria verticillata</i> scattered tussock grasses

### 3.2.5.3 Vegetation Attributes Assessment

A summary of the attributes associated with each vegetation association described and mapped in the Survey Area is presented in Appendix L. One vegetation association, Mi06 (recorded in both the HRA and HGP), did not have any assessed attributes associated with it. A total of 1.5 % of the HRA and 12.0 % of the HGP had no attributes recorded. Three vegetation associations (PI08, PI10 and PI11) have at least one attribute associated with each of the three broad categories. PI08 was recorded in the HRA, PI11 was recorded in the HGP, and PI10 was recorded in both the HRA and HGP. These three vegetation associations comprise 6.4 % of the HRA and 14.4 % of the HGP. The number and proportion of vegetation associations that have attributes associated with them are presented in Table 19.

Table 19: Attribute categories and their representation in the Survey Area.

Number of Attribute Categories	Specified Attribute Categories	Number of Vegetation Associations in HRA	Proportion of area of HRA (%)	Number of Vegetation Associations in HGP	Proportion of area of HGP (%)
3	Area and Location, Component, Condition	2	6.4	2	14.4
2	Area and Location, Component	1	3.1	0	0
	Area and Location, Condition	1	2.7	1	63.6
	Component, Condition	6	64.4	2	1.1
1	Area and Location	0	0	0	0
	Component	5	18.3	1	3.2
	Condition	2	2.6	3	5.8
0	No attributes	1	1.5	1	12.0

### 3.2.5.4 Other Vegetation of Interest

*Acacia aptaneura* (a variety of Mulga) was recorded in association with drainage lines, hills and plains in the Survey Area. *Acacia aptaneura* was recorded from 22 quadrats and six relevés, where its density ranged between 1 % and 45 % (Appendix M). It was recorded from 15 vegetation associations and was a dominant or consistent representative species in six of these, which are listed in Table 20.

Table 20: Communities recorded with Mulga as a dominant or consistent representative.

Vegetation Code	Vegetation Association	Average Density (%)	Sites
Hi08	<i>Acacia aptaneura</i> low open woodland over <i>Senna</i> spp. and <i>Eremophila</i> spp. scattered shrubs to open shrubland over <i>Triodia wiseana</i> ( <i>T. angusta</i> ) very open hummock grassland.	15.9	1RA06, 1RA08, 1RA17, 1RA25, 1RA26, 1RA27, 1RA35, 2RAr16
Hi09	<i>Acacia aptaneura</i> , <i>A. pruinocarpa</i> low open woodland to low woodland over <i>Eremophila cryptothrix</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> scattered shrubs to open shrubland over <i>Triodia wiseana</i> scattered hummock grasses to open hummock grassland.	3.3	1RA20, 1RA22, 1RA23
Hi14	<i>Acacia rhodophloia</i> , <i>A. aptaneura</i> tall open shrubland over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> over <i>Triodia wiseana</i> open hummock grassland.	1.5	1RA21, 1RA24
Mi08	<i>Acacia citrinoviridis</i> , <i>A. aptaneura</i> low woodland to low open forest over <i>Triodia wiseana</i> scattered hummock grasses to hummock grassland and * <i>Cenchrus ciliaris</i> scattered tussock grasses to tussock grassland.	3.0	1RA46, 2RAr03

Vegetation Code	Vegetation Association	Average Density (%)	Sites
Mi15	<i>Acacia aptaneura</i> and <i>A. kempeana</i> low open woodland to low closed forest over <i>T. wiseana</i> and / or <i>T. epactia</i> open hummock grassland to hummock grassland and * <i>Cenchrus ciliaris</i> scattered tussock grasses to open tussock grassland.	8	1GPr01
PI08	<i>Acacia xiphophylla</i> ( <i>A. aptaneura</i> ) low open woodland to low woodland over <i>Senna</i> spp., <i>Eremophila cuneifolia</i> scattered shrubs to open shrubland over <i>Triodia wiseana</i> scattered hummock grasses to open hummock grassland.	1	1RA03

### 3.2.6 Flora

A total of 295 vascular flora species representing 131 genera from 47 families were recorded within the Survey Area. The reconciliation process resulted in 30 unconfirmed or duplicate names, including infra specific ranks that were subsumed into higher ranks, being removed from the total count. See section 2.2.2 for details of the reconciliation of the species list. A complete species list is presented in Appendix N. A site by species matrix is presented in Appendix O and a vegetation association by species matrix is presented in Appendix P. The information recorded from each quadrat and relevé is presented in Appendix I. The Fabaceae (peas and wattles) family had the greatest number of species recorded, with 49 species from 12 genera represented. The *Acacia* genus had the highest number of species represented, with 21 taxa recorded. *Triodia wiseana* was the most frequently recorded species in the Survey Area. The most commonly recorded families, genera and species are listed in Table 21.

Table 21: Taxa most frequently recorded in the Survey Area.

Family	Number of taxa
Fabaceae (peas and wattles)	49
Poaceae (grasses)	40 (7)
Malvaceae (mallows)	27 (7)
Amaranthaceae (amaranths)	22 (1)
Solanaceae	14 (3)
Chenopodiaceae	14 (2)
Genus	Number of taxa
<i>Acacia</i>	21
<i>Ptilotus</i>	13
<i>Eremophila</i>	12 (2)
<i>Senna</i>	11
<i>Euphorbia</i>	10 (1)
<i>Solanum</i>	8 (1)
Species	Number of records
<i>Triodia wiseana</i>	120
<i>Ptilotus obovatus</i>	85

<i>Tribulus suberosus</i>	83
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	79
<i>Eremophila cuneifolia</i>	79
<i>Polycarpaea longiflora</i>	77

() indicates specimens that could not be confirmed to their lowest level, i.e. species or subspecies, and are not included in the total number of species.

### 3.2.6.1 Conservation Significance of Flora

No flora listed as threatened under the EPBC Act and no DRF pursuant to the *Wildlife Conservation Act 1950*, were recorded in the Survey Area.

One Priority Flora species was recorded in the Survey Area, the P3 species *Nicotiana umbratica*. In addition one potential specimen of *N. umbratica* was collected, but was unable to be identified to species level with certainty due to an absence of the descriptive vegetative features. This specimen is referred to as *N. ?umbratica*. Details of *N. umbratica* and *N. ?umbratica* locations are provided in Table 22. The locations and descriptions, including map locations, of these records are provided in Appendix Q and R.

Table 22: Locations of Priority Flora recorded in the Survey Area.

Species	Family	Priority Status	Cover (%)	Sites recorded	Vegetation Associations	Habitats recorded
<i>Nicotiana umbratica</i>	Solanaceae	P3	<1	1RA19, 2RAr16	Hi04, Hi08	Rocky outcrop on high hill.
<i>Nicotiana ?umbratica</i>	Solanaceae	P3	<1	1RA25	Hi09	Southeast facing slope into narrow valley.

### 3.2.6.2 Range Extensions

No species considered to be outside of their normal range were recorded in the Survey Area.

Eleven species recorded are considered to be at the southern extent of their range and nine species recorded are considered to be at the northern extent of their range in the Survey Area (Table 23).

Table 23: Species recorded at their northern and southern range extent in the Survey Area.

Species	Number of Sites (Opportunistic records)
<b>Southern limit of range</b>	
<i>Abutilon dioicum</i>	14
<i>Alysicarpus muelleri</i>	1
<i>Amaranthus interruptus</i>	1
<i>Boerhavia gardneri</i>	6
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	13
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	2
<i>Corchorus tridens</i>	16
<i>Corymbia flavescens</i>	1

Species	Number of Sites (Opportunistic records)
<i>Gossypium australe</i>	3
<i>Plumbago zeylanica</i>	2
<i>Tephrosia rosea</i> var. <i>rosea</i>	2
<b>Northern limit of range</b>	
<i>Acacia rhodophloia</i>	7
<i>Calandrinia schistorhiza</i>	1
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>	6 (3)
<i>Harnieria kempeana</i> subsp. <i>muelleri</i>	1
<i>Hibiscus gardneri</i>	2
<i>Lepidium oxytrichum</i>	1
<i>Marsdenia australis</i>	1
<i>Nicotiana umbratica</i>	2
<i>Sauropus crassifolius</i>	2

### 3.2.6.3 Introduced Flora

Of the 295 flora species recorded, 17 are introduced species representing 12 families. Both the Asteraceae and Poaceae families were represented by three species. The locations of introduced species recorded from quadrats, relevés and WRPs are presented in Table 24 and Appendix S. No Declared Plants (DAF 2011) or Weeds of National Significance (Thorp and Wilson 2011) were recorded. \**Argemone ochroleuca* subsp. *ochroleuca* and \**Datura leichhardtii* are recognised under the *Agriculture and Related Resources Protection Act 1976* as Declared Plants in other parts of the State but not the municipal district of Ashburton. Although listed as an introduced species on FloraBase (Western Australian Herbarium 2011), \**Portulaca oleracea* is considered a native species in northern parts of Western Australia (Hussey *et al.* 2007).

According to the IPPP (DEC 2011b), seven introduced species recorded in the Survey Area are considered to have a potentially high environmental impact: \**Acetosa vesicaria*; \**Aerva javanica*; \**Cenchrus ciliaris*; \**Cenchrus setiger*; \**Malvastrum americanum*; \**Setaria verticillata*; and \**Vachellia farnesiana*. Further information regarding the location and description of these species in the Survey Area, as well as their perceived level of threat in the Pilbara, is presented in Appendices M and S.

Table 24: Locations of Introduced Flora recorded in the Survey Area (DEC 2011b).

Species	Common Name	Family	Ecological Impact	No. of Quadrats/ Relevés (opportunistic records)	Sites Recorded	Habitats Recorded	Vegetation Associations
* <i>Acetosa vesicaria</i>	Ruby Dock	Polygonaceae	High	7 (9)	1GP03, 1RA04, 1RA46, 2RA05, 2RA07, 2RAr03, 2RAr09	Major and minor creeklines, drainage channels and floodplains; flat plain; hill.	HBr4, Ma01, Ma03, mDr32, Mi08
* <i>Aerva javanica</i>	Kapok Bush	Amaranthaceae	High	19 (21)	1GP02, 1RA02, 1RA04, 1RA05, 1RA06, 1RA08, 1RA09, 1RA14b, 1RA17, 1RA23, 1RA46, 2RA05, 2RA07, 2RA08, 2RA11, 2RA13, 2RA18, 2RAr09, 2RAr20	Floodplains, banks and flowlines of creeks; drainage lines; hills; plains.	HBr4, Hi08, Hi09, Ma01, Ma03, Mi02, Mi06, Mi08
* <i>Argemone ochroleuca</i>	Mexican Poppy	Papaveraceae	Low	1 (0)	2RA05	Major creek bed and bank.	Ma01
* <i>Bidens bipinnata</i>	Bipinnate Beggartick	Asteraceae	Unknown	14 (15)	1RA06, 1RA09, 1RA1, 1RA17, 1RA19, 1RA25, 1RA46, 2RA08, 2RA18, 2RA19, 2RAr14, 2RAr15, 2RAr16, 2RAr21	Floodplains; major and minor creeklines; drainage tracts; hills and rocky outcrops/breakaways.	HBr4, Hi04, Hi08, Hi22, Ma03, Mi02, Mi08

Species	Common Name	Family	Ecological Impact	No. of Quadrats/ Relevés (opportunistic records)	Sites Recorded	Habitats Recorded	Vegetation Associations
* <i>Cenchrus ciliaris</i>	Buffel Grass	Poaceae	High	45 (36)	See Appendix S	Floodplains; banks and flowlines of all sized creeks, rivers and drainage lines; flat and stony plains; hillslopes and rocky outcrops.	HBr4, Hi08, Hi09, Hi22, Ma01, Ma03, mDr32, Mi02, Mi06, Mi08, Mi15, Pl08, Pl10, Pl11, Hi03
* <i>Cenchrus setiger</i>	Birdwood Grass	Poaceae	High	13 (4)	1GP02, 1RA03, 1RA04, 1RA05, 1RA46, 2GPr02, 2RA02, 2RA05, 2RA11, 2RAr03, 2RAr04, 2RAr09, 2RAr14	Banks and flowlines of creeks; floodplains; drainage lines; stony plain.	Ma01, Ma03, mDr32, Mi06, Mi08, Pl08
* <i>Citrullus colocynthis</i>	Colocynth	Cucurbitaceae	Low	9 (11)	1GPr01, 1RA03, 1RA04, 1RA05, 2RA05, 2RA11, 2RAr04, 2RAr09, 2RAr15	Floodplains; major and minor creeks and creek beds; hills; plains.	Ma01, Ma03, mDr32, Mi02, Mi06, Mi15, Pl08
* <i>Cucumis melo</i> subsp. <i>agrestis</i>	Ulcardo Melon	Cucurbitaceae	Not Assessed	1 (0)	2RA05	Major creek bed and bank.	Ma01
* <i>Datura leichhardtii</i>	Native Thornapple	Solanaceae	Low	1 (0)	1RA14b	Banks and flow line of creek.	Ma03
* <i>Euphorbia hirta</i>	Asthma Plant	Euphorbiaceae	Low	2 (0)	2RA05, 2RAr09	Flood plain with incised channels; major creek bed and bank.	Ma01, Ma03

Species	Common Name	Family	Ecological Impact	No. of Quadrats/ Relevés (opportunistic records)	Sites Recorded	Habitats Recorded	Vegetation Associations
* <i>Flaveria trinervia</i>	Speedy Weed	Asteraceae	Not Assessed	9 (10)	1RA09, 1RA1, 1RA14b, 1RA17, 2RA13, 2RA18, 2RAr03, 2RAr14, 2RAr20	Major and minor creeklines; hills and rocky slopes.	HBr4, Hi08, Ma03, Mi02, Mi08, PI08
* <i>Malvastrum americanum</i>	Spiked Malvastrum	Malvaceae	High	3 (4)	2RA05, 2RAr15, 2RAr20	Major creek bed; minor creeks; minor drainage channels.	Ma01, Mi02
* <i>Portulaca oleracea</i>	Purslane	Portulacaceae	Not Assessed	26 (4)	See Appendix S	Hills and rocky slopes; plains; drainage channels and floodplains.	HBr4, Hi08, Hi09, Hi16, Hi22, mDr32, Mi08, Mi15, PI08, PI10, PI11, Hi03
* <i>Setaria verticillata</i>	Whorled Pigeon Grass	Poaceae	High	2 (1)	2RA18, 2RAr15	Major creekline; minor drainage channel; minor creek.	Mi02
* <i>Sisymbrium orientale</i>	Indian Hedge Mustard	Brassicaceae	Low	1 (0)	2RA05	Major creek bed and bank.	Ma01
* <i>Sonchus oleraceus</i>	Common Sowthistle	Asteraceae	Low	2 (0)	2RA05, 2RAr15	Major creek bed and bank; minor drainage channel.	Ma01, Mi02
* <i>Vachellia farnesiana</i>	Mimosa Bush	Fabaceae	High	2 (0)	2RA05, 2RAr04	Major creek bed and bank; broad floodplain.	Ma01, mDr32



## 4 Discussion

The HRA occurs at the southern extent of the Hamersley Ranges, and as such is at the southern extent of the Fortescue Botanical District. The dominance of some taxa more typical of the Ashburton Botanical District to the south (e.g. *Eremophila* spp. and Mulga species *Acacia aptaneura*) indicates that this area is a transition zone between the two botanical districts. The HRA is typified by complex geology and landforms, with strike ridges, scarps, rolling hills and debris slopes at the eastern end of the Hardey Syncline, above locally complex drainage systems (Blandford 2011). The HGP alignment crosses an almost homogenous and flat landscape in the floodplain of the Hardey River.

A variety of often small scale (approximately 2 ha) and potentially restricted landforms occur in the HRA, many of which support a specific suite of vascular flora taxa. These include:

- Potential soaks that support dense thickets of *Melaleuca glomerata*; calcrete lined drainage tracts and rock pools with sparse surrounding upper vegetation, but a diverse suite of herbaceous species;
- Localised dolerite rockpiles that occur in the north along ridge lines of rolling hills with a diverse suite of shrub and herbaceous species;
- Caves and overhangs in erosion resistant rocky mantles, which in combination with narrow gullies (particularly in south facing parts) provide niche sheltered habitat for heat and drought sensitive flora species such as *Lobelia heterophylla* subsp. *pilbarensis* and *Nicotiana* spp.; and
- Sheer rock faces with habitat specific taxa such as *Ficus brachypoda* and *Astrotricha hamptonii*.

Many of these areas likely to provide refugia from fire (Kendrick 2001a) and are typically species rich. As vegetation was mapped to a scale consistent with the adjoining HRC and HBP many small scale landforms and vegetation changes were not able to be included in the representative vegetation mapping, and generalisations were made. In particular, where landforms and vegetation changed according to topographic relief (e.g. sheer rock faces) that could not be differentiated on aerial photography, or where discrete vegetation changes were particularly isolated (e.g. rockpiles and tops of strike ridges) these were not able to be captured on the two dimensional maps at the current scale.

Fourteen survey sites in the Survey Area did not group with other sites from either the HRA or HGP in the floristic analysis. Eight of these, however, grouped with sites from the broader Project Area. All of the six survey sites identified as statistical outliers occur in the HRA. Relevé 2RAr15 is considered unique to any of the other quadrats or relevés surveyed. Vegetation at this site is dominated by a dense stand of *Melaleuca glomerata* over a species rich herbaceous lower stratum, and is associated with a potential soak in the northern part of the Survey Area. The other sites identified as floristically individual (1RA06, 1RA14b, 1RA21, 1RA22, 1RA26), appear to be structurally similar to other survey sites, but may also include some species more typical of other vegetation groups. Three of these vegetation associations occur on the Marra Mamba formation located in the south of the Resource Area.

Three vegetation associations had three attribute categories associated with them in this assessment, PI08 was recorded in the HRA only (covering 0.7 % of the Survey Area), PI11 was recorded in the HGP only (14.2 %), and PI10 was recorded in both the HRA and HGP (5.7 % and 0.2 %, respectively). The three vegetation associations fulfilling three attribute categories each

represent Beard (1975) vegetation associations of High or Medium priority for reservation (Kendrick 2001a and Kendrick 2001b), support the Mulga species *Acacia aptaneura*, and are in Excellent condition. None of these vegetation associations supported Priority flora in the Survey Area and all are considered relatively widespread in the Hamersley and/or Ashburton subregions. One vegetation association in the Survey Area had no attributes associated with it; Mi06 was recorded in both the HRA and HGP (1.5 % and 12.0 % respectively). It should be noted that generalisations are made across an entire vegetation association and are based on the Survey Area, not the proposed disturbance (footprint) or impact area.

One variety of Mulga, *Acacia aptaneura*, was recorded in the Survey Area. In the HRA, Mulga was most often associated with strike ridges, scarp tops and scree slopes, but also occurred along drainage lines and on plains to a lesser degree. No linear infrastructure is proposed for the HRA, and Mulga occurring on hills and slopes is not likely to be affected by any changes to surface water flow. The occurrence of Mulga in the HGP alignment is minimal and restricted to the north of the alignment, where it adjoins the HRC. It is proposed that the HGP will be installed below the ground surface or raised to minimise any potential surface hydrology impacts.

Two of the three Phase 1 survey trips were conducted during poor seasonal conditions, and as a result, there was an increase in the number of taxa recorded during the Phase 2 surveys, which were undertaken in much improved seasonal conditions. This indicates a considerable proportion of annual and/or ephemeral species occur in the Survey Area. Due to this Survey Area occurring in the transition zone between two botanical districts, it is difficult to assess whether the suite of species recorded in the HRA and HGP is considered typical. Two of the reports reviewed for comparison did not present the size of their Survey Area, but it appears that the number of species recorded from the HRA and HGP is comparable to other resource areas previously surveyed, and may be considered more species rich than some (Biota 2005 and Biota 2008). High species richness in the Survey Area may be attributed to the diversity of landforms, the intensive sampling undertaken, and the good seasonal conditions for at least the Phase 2 surveys.

The DEC database searches listed two DRF species recorded from within 50 km of the Survey Area, *Lepidium catapycnon* and *Thryptomene wittweri*, both of which are also listed under the EPBC Act as Vulnerable. Habitats where these species might occur in the Survey Area were considered adequately surveyed, and it is therefore unlikely that they occur. The P3 species *Nicotiana umbratica* was recorded from two sites in the HRA. One additional specimen that may potentially be *N. umbratica* was collected but was unable to be confirmed due to an absence of the descriptive seeds or flowers. The occurrence of *N. umbratica* in the HRA makes it the southern most location of this species (Western Australia Herbarium 2011). *Eriachne tenuiculmis* was reported as a P3 species from one location in the HRA following the Phase 1 surveys (Astron 2011b). Although this species was recorded from one additional site during the Phase 2 survey, it is no longer listed as a Priority taxon (Western Australia Herbarium 2011).

Tree species in creeks and rivers of the Pilbara are known to support numerous fauna species, and are therefore considered important habitat (van Vreeswyk *et al.* 2004; and Rio Tinto 2007). These drainage systems, and the vegetation they support, can also be susceptible to changes in surface and groundwater hydrology as some species have specific water requirements. Species in the Survey Area that are sensitive to changes in groundwater levels include *Eucalyptus camaldulensis*, *E. victrix* and *Melaleuca glomerata*, all of which are facultative phreatophytes and utilise groundwater in times of limited surface water supply (Department of Water 2011; Keitel and Adams 2009; Astron 2008). *Eucalyptus victrix* has also been reported to suffer following prolonged inundation (Strategen 2006).

The density and diversity of introduced flora recorded in the Survey Area increased considerably between the Phase 1 and Phase 2 surveys. Ten introduced flora species recorded during the Phase 2 surveys had not been observed during the Phase 1 surveys, and include *\*Acetosa vesicaria*, *\*Cucumis melo* subsp. *agrestis*, *\*Datura leichardtii*, *\*Euphorbia hirta*, *\*Flaveria trinervia*, *\*Malvastrum americanum*, *\*Portulaca oleracea*, *\*Setaria verticillata*, *\*Sonchus oleraceus* and *\*Vachellia farnesiana*. This increase in introduced species diversity is likely to be in part due to improved seasonal conditions during the Phase 2 surveys, but may possibly also be attributed to the increase in project related activity in the HRA. Eleven of the introduced flora recorded (*\*A. vesicaria*, *\*Aerva javanica*, *\*Argemone ochroleuca* subsp. *ochroleuca*, *\*Bidens bipinnata*, *\*Cenchrus ciliaris*, *\*C. setiger*, *\*Citrullus colocynthis*, *\*M. americanum*, *\*S. verticillata*, *\*Sonchus oleraceus* and *\*V. farnesiana*) were ranked as having Rapid invasiveness by the IPPP, and seven of these (*\*A. vesicaria*, *\*A. javanica*, *\*C. ciliaris*, *\*C. setiger*, *\*M. americanum*, *\*S. verticillata* and *\*V. farnesiana*) are considered to have potentially High environmental impact (DEC 2011b). Five of these species, *\*A. vesicaria*, *\*M. americanum*, *\*S. verticillata*, *\*S. oleraceus* and *\*V. farnesiana*, were not recorded during the Phase 1 surveys.

## 5 Conclusions

All quadrats and relevés from the HRA and HGP were surveyed at least once during good seasonal conditions. The Survey Area is considered to have been adequately sampled, and the species list compiled provides a representative overview of the considerable diversity of species in the Survey Area, including the occurrence of a Priority 3 flora species and 17 introduced flora species. No Commonwealth listed Threatened Flora were identified in the Survey Area, and no DEC listed DRF were recorded.

A total of 25 vegetation associations were described and mapped in the Survey Area, including 19 in the HRA and ten in the HGP. Although vegetation mapping completed in the HRA is at a scale not suitable for capturing many of the small scale landform and vegetation changes that occur, it does provide an overview of the variation in vegetation communities, and the patterns in vegetation between landforms that occurs.

No Commonwealth listed or Western Australian listed TECs nor PECs were identified within the Survey Area. Six of the floristic community groups identified from the floristic analysis consist of only one survey site, and all occur in the HRA. One of these floristic communities is considered of interest at a local scale. Five of the floristic communities appeared structurally similar to other sites and it is considered unlikely that they are under-represented in the area.

Vegetation in the Survey Area ranged from Excellent to Poor. The HGP generally had a higher density of introduced flora than the HRA, and the impacts of grazing were more evident. Hills, slopes and stony plains were typically in Excellent condition, while floodplains and drainage areas were more degraded.

Five of the vegetation associations recorded for the HRA are considered analogous to four vegetation associations considered 'at risk' in the Hamersley or Ashburton subregions (Kendrick 2001a and 2001b). The listed vegetation associations are 'all major ephemeral water courses'; 'hill-top floras, Hamersley Ranges'; 'valley floor Mulga'; and 'Mulga creekline communities, alluvial plains of the Ashburton' and total approximately 10 % of the HRA. Two vegetation associations described for the HGP are also considered analogous to 'Mulga creekline communities, alluvial plains of the Ashburton' and cover approximately 3 % of the HGP.

Three vegetation associations described and mapped in the HRA are considered analogous to three Beard (1975) vegetation associations listed as High or Medium priority for reservation in the conservation estate for the Hamersley subregions (Kendrick 2001a and Kendrick 2001b). These vegetation associations occur over approximately 10 % of the HRA. Two vegetation associations mapped in the HGP are considered analogous to two vegetation associations listed as High or Medium reservation priority in the Hamersley subregion and/or Ashburton subregion, and occur over approximately 14 % of the HGP.

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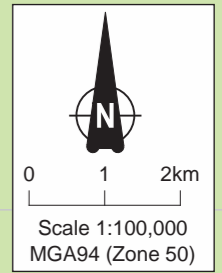
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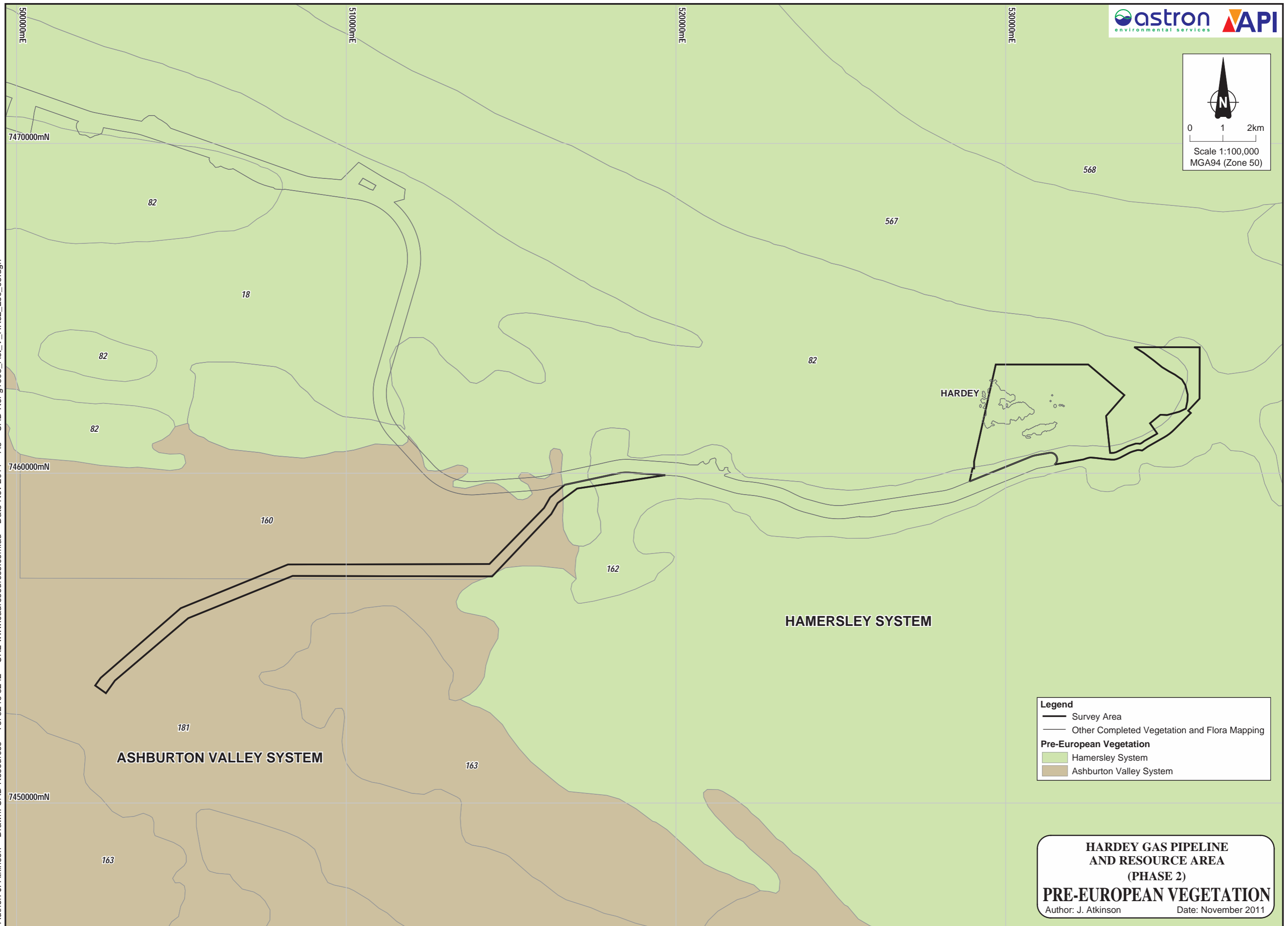


## **Appendix A: Pre-European Vegetation and Land Systems Mapping**

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**Legend**

- Survey Area
- Other Completed Vegetation and Flora Mapping

**Pre-European Vegetation**

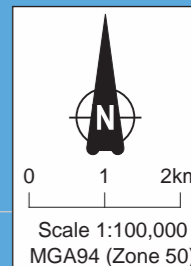
- Hamersley System
- Ashburton Valley System

**HARDEY GAS PIPELINE  
AND RESOURCE AREA  
(PHASE 2)**

**PRE-EUROPEAN VEGETATION**

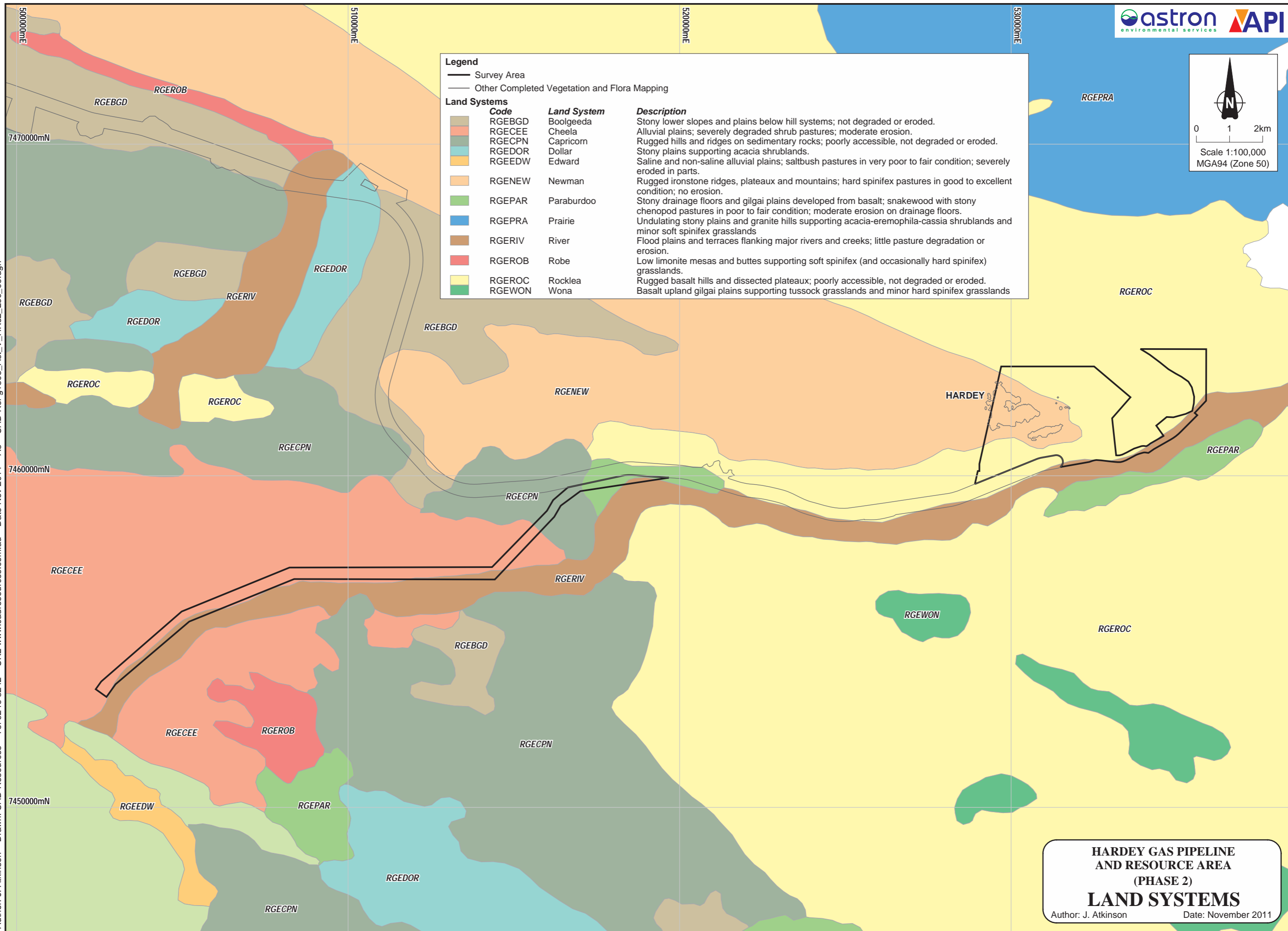
Author: J. Atkinson      Date: November 2011

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Legend		
	Survey Area	
	Other Completed Vegetation and Flora Mapping	
Land Systems		
Code	Land System	Description
	RGEBGD Boolgeeda	Stony lower slopes and plains below hill systems; not degraded or eroded.
	RGECEE Cheela	Alluvial plains; severely degraded shrub pastures; moderate erosion.
	RGECPN Capricorn	Rugged hills and ridges on sedimentary rocks; poorly accessible, not degraded or eroded.
	RGEDOR Dollar	Stony plains supporting acacia shrublands.
	RGEEDW Edward	Saline and non-saline alluvial plains; saltbush pastures in very poor to fair condition; severely eroded in parts.
	RGENEW Newman	Rugged ironstone ridges, plateaux and mountains; hard spinifex pastures in good to excellent condition; no erosion.
	RGEPAR Paraburdoo	Stony drainage floors and gilgai plains developed from basalt; snakewood with stony chenopod pastures in poor to fair condition; moderate erosion on drainage floors.
	RGEPRRA Prairie	Undulating stony plains and granite hills supporting acacia-eremophila-cassia shrublands and minor soft spinifex grasslands
	RGERIV River	Flood plains and terraces flanking major rivers and creeks; little pasture degradation or erosion.
	RGEROB Robe	Low limonite mesas and buttes supporting soft spinifex (and occasionally hard spinifex) grasslands.
	RGEROC Rocklea	Rugged basalt hills and dissected plateaux; poorly accessible, not degraded or eroded.
	RGEWON Wona	Basalt upland gilgai plains supporting tussock grasslands and minor hard spinifex grasslands

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**HARDEY GAS PIPELINE AND RESOURCE AREA (PHASE 2)**  
**LAND SYSTEMS**  
 Author: J. Atkinson Date: November 2011

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## **Appendix B: Definitions, Categories and Criteria for Threatened and Priority Ecological Communities**

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Table B.1: Categories of Threatened Ecological Communities (DEC 2007)

<b>PD: Presumed Destroyed</b>
<p>An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.</p> <p>An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies ( A or B):</p> <p>A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or</p> <p>B) All occurrences recorded within the last 50 years have since been destroyed.</p>
<b>CR : Critically Endangered</b>
<p>An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.</p> <p>An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):</p> <p>A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):</p> <p>i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);</p> <p>ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.</p> <p>B) Current distribution is limited, and one or more of the following apply (i, ii or iii):</p> <p>i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);</p> <p>ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;</p> <p>iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.</p> <p>C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).</p>

**En: Endangered**

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

**VU: Vulnerable**

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

**Table B.2: Definitions and Criteria for Priority Ecological Communities: Priority Ecological communities (DEC 2009).**

<b>P1: Priority One – Poorly-known ecological communities</b>
Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
<b>P2: Priority Two – Poorly-Known ecological communities</b>
Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
<b>P3: Priority Three – Poorly-Known ecological communities</b>
(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
<b>P4: Priority Four</b>
Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (a) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Ecological communities removed from the list of threatened communities during the past five years.
<b>P5: Priority Five – Conservation dependent ecological communities</b>
Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

**Table B.3: Definitions and Criteria for Threatened Ecological communities (DSEWPC 2010b).**

<b>Categories of Ecological Communities</b>	
Critically endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

## **Appendix C: Categories of Conservation Significant Flora Species**

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Table C.1: Categories of Conservation Significant Flora Species (*Wildlife Conservation Act 1950*).

<p><b>T: Threatened Flora – (Declared Rare Flora - Extant)</b></p> <p>Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the <i>Wildlife Conservation Act 1950</i>).</p> <p>Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria:</p> <ul style="list-style-type: none"> <li>• CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild</li> <li>• EN: Endangered – considered to be facing a very high risk of extinction in the wild</li> <li>• VU: Vulnerable – considered to be facing a high risk of extinction in the wild.</li> </ul>
<p><b>X: Presumed Extinct Flora (Declared Rare Flora – Extinct)</b></p> <p>Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the <i>Wildlife Conservation Act 1950</i>).</p> <p>Species that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora List under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna. Species that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Conservation Dependent species are placed in Priority 5.</p>
<p><b>P1: Priority One - Poorly Known</b></p> <p>Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.</p>
<p><b>P2: Priority Two - Poorly Known</b></p> <p>Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.</p>
<p><b>P3: Priority Three - Poorly Known</b></p> <p>Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.</p>
<p><b>P4: Priority Four - Rare, Near Threatened and other species in need of monitoring</b></p> <p>a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

**P5: Priority Five: Conservation Dependent Species**

Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

**Table C.2: Categories of Threatened Species, according to Section 179 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (DSEWPC 2010).**

<b>Section 179 Categories of Threatened Species</b>	
(1) A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.	
(2) A native species is eligible to be included in the extinct in the wild*category at a particular time if, at that time:	
	(a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
	(b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
(3) A native species is eligible to be included in the critically endangered*category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.	
(4) A native species is eligible to be included in the endangered category* at a particular time if, at that time:	
	(a) it is not critically endangered; and
	(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
(5) A native species is eligible to be included in the vulnerable category* at a particular time if, at that time:	
	(a) it is not critically endangered or endangered; and
	(b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
(6) A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:	
	(a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or
	(b) the following subparagraphs are satisfied:
(i) the species is a species of fish;	
(ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;	
(iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory;	
(iv) cessation of the plan of management would adversely affect the conservation status of the species.	
(7) In subsection (6):	
fish includes all species of bony fish, sharks, rays, crustaceans, molluscs and other marine organisms, but does not include marine mammals or marine reptiles.	



## **Appendix D: Categories of Introduced Flora Species**

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**Table D.1: Declared Plants Management Ratings as Gazetted under the Agriculture and Related Resources Protection Act 1976.**

<b>Listed species have a priority rating which defines their required level of management.</b>	
Priority 1	Introduction of the plant into, or movement of the plant within, an area is prohibited;
Priority 2	Plant to be eradicated in the area.
Priority 3	Plant to be controlled by reduction in number or distribution of the plant or both.
Priority 4	Spread of plant beyond where it currently occurs to be prevented.
Priority 5	Particular action to be taken on public land or land under the control of a local government.

**Table D.2: Environmental Weed Strategy Ranking of Species (DEC 1999).**

<b>Criteria for Assessment of Weed Species</b>	
Invasiveness	Ability to invade bushland in good to excellent condition or ability to invade waterways. (Score as yes or no).
Distribution	Wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world. (Score as yes or no).
Environmental Impacts	Ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community. (Score as yes or no).
<b>Rating of Weed Species</b>	
High	A weed species would have to score yes for all three criteria. Rating a weed species as high would indicate prioritising this weed for control and/or research ie. prioritising funding to it.
Moderate	A weed species would have to score yes for two of the above criteria. Rating a weed species as moderate would indicate that control or research effort should be directed to it if funds are available, however it should be monitored (possibly a reasonably high level of monitoring).
Mild	A weed species scoring one of the criteria. A mild rating would indicate monitoring of the weed and control where appropriate.
Low	A weed species would score none of the criteria. A low ranking would mean that this species would require a low level of monitoring.

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## **Appendix E: Vegetation Classification and Vegetation Condition Scales**

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Table E.1: Vegetation Classification System Specht (1970) as modified by Aplin (1979).

Stratum	70-100% cover	30-70% cover	10-30% cover	2-10% cover	<2% cover
Trees > 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 < 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs > 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 < 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/ sedgeland/ herbland	Tussock grassland/ sedgeland/ herbland	Open tussock grassland/ sedgeland/ herbland	Very open tussock grassland/ sedgeland/ herbland	Scattered tussock grasses / sedges / herbs

Table E.2: Summary of adapted Vegetation Condition Scale as developed by Keighery (1994) and Kaesehagen (1995).

Rating	Condition	Descriptive Features
1	Excellent	>80% native flora composition Vegetation structure (nearly) intact Minor signs of disturbance Weeds are non-aggressive species (cover <5%)
2	Good	60-80% native flora composition Vegetation structure altered in places Obvious signs of disturbance Weed abundance / cover 5-20%
3	Fair	40-60% native flora composition Vegetation structure significantly altered yet retains basic structure or ability to regenerate to it Very obvious signs of multiple disturbance Weed cover / abundance 50-80%
4	Poor/ Partially Degraded	20-40% native flora composition Vegetation structure severely impacted by disturbance Scope for regeneration but not to a level approaching "Good" condition without intensive management Weed cover / abundance 50-80%
5	Completely Degraded	<20% native flora composition Vegetation structure impacted beyond regeneration Extensive modification and disturbance present Weeds are highly invasive (cover / abundance >80%)

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## **Appendix F: Statistical Data Analysis**

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## 1 Data Analysis Methodology

The purpose of the data analysis was to determine if there are groupings of similar quadrats and relevés (together referred to as ‘survey sites’), and to examine if specific variables may relate to these groupings. In particular, landforms (as identified by Astron field surveys) and land systems (Payne et al. 1988; Van Vreeswyk et al. 2004). It was also considered useful to investigate whether seasonal conditions affected the floristic groupings between Phase 1 and Phase surveys; and whether the sampling type (i.e. quadrat or relevé) affects floristic groups. Specifically, the data analysis aimed to examine the following questions:

- Do a range of floristic groups occur within a Survey Area and how many are related to this Survey Area?;
- Is there a correlation between landforms and numerical (floristic) groups?;
- Is there a correlation between land systems and numerical (floristic) groups?; and
- Do the floristic groups identified in the Survey Area compare to those at a wider (regional) scale?;
- Does seasonal variability affect the floristics of the Survey Area?;
- Are the sample types (i.e. quadrat or relevé) comparable (i.e. is there a significant difference between the floristics of quadrats and relevés recorded in this survey)?

The analyses used were multivariate techniques commonly used in vegetation surveys and sometimes known as ‘Pattern Analysis’. This term should not be confused with the computer software that can be used for Pattern Analysis called *PATN*.

One main analytical technique used was *Classification* – this produces a ‘link-tree’ diagram showing the groupings of survey sites. The diagram is called a dendrogram.

Prior to undertaking classification, data transformation and calculations of survey site resemblance or similarity are required. These techniques are further described below.

The analysis is applied at both a local scale and a regional scale. The local scale analysis is based on survey data from quadrats and relevés identified as inside the project area. The project area is defined as the Hardey project area as a whole, encompassing the Hardey Resource Area (HRA) and Hardey Gas Pipeline (HGP), as well as the Hardey Rail Corridor (HRC) and Hardey Borrow Pits (HBP) (Astron 2011). The regional scale analysis is based on data from sites inside the project area and outside of the project area. Sites from outside of the project area include those surveyed as part of the WPIOP project (Mount Stuart Access Track, Gas Pipeline, Airstrip Access Track and Southern Access Road), as well as sites that were originally surveyed for the HRC but are now outside of the corridor due to design changes.

### 1.1 Data transformation

Data transformations in multivariate analyses allow a better interpretation of changes in floristics due to the loss or increase in the occurrence of species (Clarke and Green, 1988). In this current report, presence-absence transformations were used following the recommendations of the

Department of Environment and Conservation for analyses undertaken in the Pilbara (S. van Leeuwen, Pers. Comm.).

## 1.2 Classification

Classification tests the relationships between each survey sites similarity (or dissimilarity) to all other survey sites. The data are organised as a Resemblance Matrix and several indices can be used to generate measures of similarity. In this current study, the Bray Curtis metric was used to generate the resemblance matrix (Clarke and Warwick, 2001; Clarke and Gorley, 2006).

The purpose of classification is to produce a figure called a dendrogram that allows patterns in the data to be identified. In their simplest form, dendrograms are a visual aid and they allow obvious groups of survey sites to be identified. On their own they are not a test of the groups.

Test for significant groups of survey sites uses a technique called Similarity Profile Analysis (SIMPROF). The test indicates if groups of survey sites are significantly associated. This is indicated by a 'P-value', which for significant groups using this technique should be less than 0.01 (Clarke and Gorley, 2006).

## 1.3 Ordination and Analysis of Similarity

The purpose of ordination is to show the relationship between individual survey sites rather than the groupings of individual sites, which is the outcome of classification. The output of an ordination analysis is called an ordination plot, which is similar to a scatter plot. The intention of undertaking an ordination analysis in this project is to display the relationship between survey sites, and to examine if the categories of Landform and Land System offer any explanation to the composition of individual sites. On its own, ordination is not a test of significance of a grouping, or change. This requires a specific test called Analysis of Similarity (ANOSIM). Ordination plots should be viewed along with this test of significance to help interpret the distribution of survey sites within the plot.

The purpose of undertaking an ANOSIM is to test for the significance of groupings of survey sites based on identified categories (*a priori* factors in the data). In this current analysis, one-way ANOSIM was used to test the hypothesis that sites surveyed within one Landform or Land System are significantly different from sites surveyed in another. The significance of the test is indicated by a 'P-value', which for significant groups using this technique should be less than 0.01 (Clarke and Gorley, 2006). If the ANOSIM is significant, then each Landform or Land System can be compared to identify which pairs are significantly different.

All data analyses were carried out using the appropriate modules of *Primer v6* software (Clarke and Gorley, 2006).

## 2 Data Analysis Results

The ordination plot for all data from 2011 based on Position (inside or outside of the project area) is presented in Figure F.1. The one-way ANOSIM for Position indicates that differences between survey sites inside the project area and survey sites outside the project area is highly significant (Global  $R=0.354$ ,  $P<0.001$ ). It was therefore suitable to perform two sets of analyses, one local analysis (including sites within the project area only) and one global analysis (including sites both inside and outside the project area). This gives a more precise assessment of the vegetation communities within the project area, while still allowing for a broader analysis of the project area and its surroundings.

### 1.4 Local Scale Analysis

The local scale analysis is based on 2011 data for survey sites inside the project area. Previous survey data from 2010 represents the presence/absence of species following an extended dry period. The high rainfall that occurred between 2010 and 2011 resulted in an increase in the presence of species across the region and as such, the 2011 survey data is a more complete representation of the vegetation communities. An investigation into some of the similarities and differences in the 2010/2011 regional data (i.e. all survey site data) was undertaken prior to the local scale analysis to support this decision. The ordination plot for all data based on year is presented in Figure F.2. The one-way ANOSIM for Year indicates that differences between years is significant (Global  $R=0.21$ ,  $P<0.001$ ). This is likely to be due to rainfall prior to 2011. Data from 2010 is not used in the local scale analysis.

It was also considered worthwhile to verify whether the data from relevés differs from true quadrats in any significant way. The ordination plot for all data from 2011 based on Type (i.e. true quadrat or relevé) is presented in Figure F.3. The one-way ANOSIM for Type indicates that difference between the true quadrats and relevés is not significant (Global  $R=0$ ,  $P=0.502$ ). Survey data from relevés is therefore suitable to include in the analysis alongside data from true quadrats.

Numerically significant groups are identified in the classification dendrogram where a vertical black line splits to red (eg. Figure F.4). Classification using 2011 presence/absence data from survey sites inside the project area (including HRC and HBP) produced 59 numerical (floristic) groupings ( $P_i=4.25$ ,  $P=0.005 < 0.01$  i.e. significant) (referred to as Floristic Community Groups (FCGs)) and 12 ungrouped sites. For the HRA and HGP only, a total of 30 grouped FCGs and 14 ungrouped FCGs were identified. Eight of the ungrouped FCGs were associated with other sites in the HRC and HGP project.

A list of the FCGs and the HRA and HGP survey sites associated with each of these groupings is presented in Table F.1.

Table F.1. Floristic Community Groups and the Survey Sites Associated with them from the HRA and HGP.

Floristic Community Group	Associated Survey Sites (quadrats and relevés)
FCG01*	2RA01, 6RAr01, 1RA01, 1RA03
FCG02*	1GPr01, 1RA46, 2RA02, 2RA11, 2RAr03
FCG03*	1RA37, 2RA08, 2RA07, 2RAr06, 1RA02, 1RA29, 1RA38, 2RA17, 1RA45, 2RA22, 1RA28, 2RA10
FCG04*	2RAr04, 1GP10
FCG06*	1RA18
FCG08	1RA30, 1RA33, 1RA40, 1RA13, 1RA12, 1RA36, 3RAr03, 1RA31, 1RA32
FCG18	1RA19, 1RA23, 1RA08, 1RA27, 1RA17, 1RA25
FCG20*	2RA12
FCG22*	3RAr04
FCG25*	2RAr09, 2RAr14, 1RA04, 1RA05
FCG26	1GP02, 1GPr08, 1GP03, 2GPr02
FCG28	1RA16, 1RAr10, 1RA15, 1RA34
FCG30*	2RA13
FCG34*	1GPr12
FCG35*	1GPr04
FCG36*	3RAr01
FCG37	1RA24, 1RA20, 1RA35
FCG38*	2RA05
FCG40*	1RA09, 2RAr20
FCG43	1GP06, 2GPr01
FCG47	1RA07, 1RA14
FCG48	1RA11, 3RAr02
FCG58	2RA19, 2RAr16
FCG59	2RA18, 2RAr21
FCG63	1RA22
FCG69	1RA14b
FCG66	1RA26
FCG64	1RA21
FCG65	1RA06
FCG71	2RAr15

\*Includes FCGs that also include sites from the HRC and HGP project.

The numerical groupings were found to be well aligned with the five categories of Landform (Figure F.4). For example, the Hills and Breakaways landform, as represented by the blue triangle symbols, are shown to be concentrated in several groups, particularly in the right-centre position of the dendrogram (Figure F.4). In larger numerical groups, some overlap between categories is likely to occur since a number of species are quite cosmopolitan across these landforms. This is particularly the case for the Plains, Minor Drainage and Major Drainage.

The numerical groupings were also found to be aligned with the ten categories of Land System, as is presented in Figure F.5. However, a greater degree of overlap between groupings was evident when categorising according to Land System in comparison to that of Landform. This is a consequence of

the greater number of categories (ten categories in Land Systems versus five categories in Landform), resulting in a greater number of cosmopolitan species.

The relationship between survey sites is further examined by the ordination plots and ANOSIM for the five categories of Landform and the ten categories of Land System. The ordination plot for data from 2011 (inside project area) and categorised according to Landform is presented in Figure F.6. The one-way ANOSIM for Landform indicates that differences between Landform categories are highly significant (Global R=0.369, P<0.001). The five categories resulted in a total of ten pairwise tests, all of which were highly significant (P<0.001). This indicates that the categories of Landform provide a good explanation for the groupings of quadrats (Table F.3).

**Table F.3: Pairwise tests for Landforms.**

Significant Difference Between Pairs		
Pairwise Test (Landform)	R-Statistic	P-Value (P<0.01)
Minor drainage, Hills / breakaways	0.324	0.001
Minor drainage, Plain	0.431	0.001
Minor drainage, Floodplain	0.077	0.001
Minor drainage, Major drainage	0.356	0.001
Hills / breakaways, Plain	0.343	0.001
Hills / breakaways, Floodplain	0.385	0.001
Hills / breakaways, Major drainage	0.627	0.001
Plain, Floodplain	0.343	0.001
Plain, Major drainage	0.809	0.001
Floodplain, Major drainage	0.313	0.001

The ordination plot for data from 2011 (inside project area) and categorised according to Land System is presented in Figure F.7. The one-way ANOSIM for Land System indicates that differences between Land System categories are highly significant (Global R=0.237, P<0.001). However, in contrast to Landform, not all pairwise tests for Land System were found to be significant (i.e. P>0.01 for some pairs). The ten categories resulted in 45 pairwise tests, 20 of which were significantly different (P<0.01) (Table F.4) and 25 that were not (P>0.01) (Table F.4).

**Table F.4: Land Systems with significant differences between pairs.**

Significant Difference Between Pairs		
Pairwise Test (Land System)	R-Statistic	P-Value (P<0.01)
Boolgeeda, Capricorn	0.3	0.001
Boolgeeda, Cheela	0.276	0.002
Boolgeeda, Newman	0.306	0.001
Boolgeeda, River	0.461	0.002
Boolgeeda, Robe	0.258	0.006
Boolgeeda, Rocklea	0.165	0.001
Capricorn, Cheela	0.364	0.001
Capricorn, Newman	0.133	0.001
Capricorn, River	0.424	0.001
Newman, Cheela	0.733	0.001

Significant Difference Between Pairs		
Pairwise Test (Land System)	R-Statistic	P-Value (P<0.01)
Newman, Dollar	0.612	0.004
Paraburdoo, Capricorn	0.163	0.008
Paraburdoo, Cheela	0.318	0.005
Paraburdoo, Newman	0.506	0.001
Paraburdoo, Robe	0.369	0.001
River, Newman	0.808	0.001
Robe, Cheela	0.491	0.003
Robe, Newman	0.299	0.005
Rocklea, Capricorn	0.24	0.001
Rocklea, Cheela	0.454	0.001
Rocklea, Newman	0.166	0.001
Rocklea, River	0.597	0.001
Rocklea, Robe	0.243	0.005

Table F.5. Land Systems with no significant difference between pairs.

No Significant Difference Between Pairs		
Pairwise Test (Land System)	R-Statistic	P-Value (P>0.01)
Augustus, Cheela	0.343	0.067
Augustus, Dollar	0	0.667
Boolgeeda, Augustus	-0.216	0.879
Boolgeeda, Dollar	-0.128	0.74
Boolgeeda, Paraburdoo	0.021	0.367
Capricorn, Augustus	-0.028	0.51
Capricorn, Dollar	0.208	0.118
Capricorn, Robe	-0.055	0.743
Dollar, Cheela	-0.209	0.844
Newman, Augustus	0.271	0.118
Paraburdoo, Augustus	0.229	0.192
Paraburdoo, Dollar	0.212	0.192
Paraburdoo, River	0.436	0.015
River, Augustus	-0.418	1
River, Cheela	0.32	0.02
River, Dollar	-0.282	0.905
Robe, Augustus	-0.179	0.8
Robe, Dollar	0.056	0.4
Robe, River	0.276	0.03
Rocklea, Augustus	-0.037	0.543
Rocklea, Dollar	0.233	0.13
Rocklea, Paraburdoo	0.17	0.025



## 1.5 Regional Scale Analysis

The regional scale analysis was undertaken to examine if the categories of Landform and Land System were suitable for describing the differences in vegetation over a much broader area. All survey data from 2011 was used in the analysis (inside and outside the project area). As there was found to be no significant difference between survey site type (true quadrat and relevé) relevés (Global  $R=0$ ,  $P=0.502$  i.e.  $P>0.01$ ), both sets of data were used in the analysis.

The classification analysis (including SIMPROF analysis) indicated 92 groups of various numbers of quadrats and 16 ungrouped quadrats ( $P_i=4.666$ ,  $P=0.005<0.01$ , i.e. significant). Trends in groupings by Landform and Land System were, in general, similar to the classification groupings in the local scale analysis (Figure F.8).

The one-way ANOSIM for the regional dataset found that differences between Landform categories were again highly significant (Global  $R=0.247$ ,  $P<0.001$ ), with all ten pairwise tests showing highly significant differences ( $P<0.001$ ).

The one-way ANOSIM for Land System was also found to be significantly different (Global  $R=0.245$ ,  $P<0.001$ ). However, the regional scale analysis included fifteen categories of Land System and resulted in 105 pairwise tests; 67 of which were significant ( $P<0.01$ ) and 38 of which were not ( $P>0.01$ ).

The regional scale analysis indicates that the categories describing the Landforms and Land Systems are helpful in explaining the survey site groupings in the classification analysis, with allowances being made for overlap as a result of the high number of sites and for those species cosmopolitan across several Landforms or Land Systems. There is a general agreement in the results of the regional scale analysis with the results of the local scale analysis.

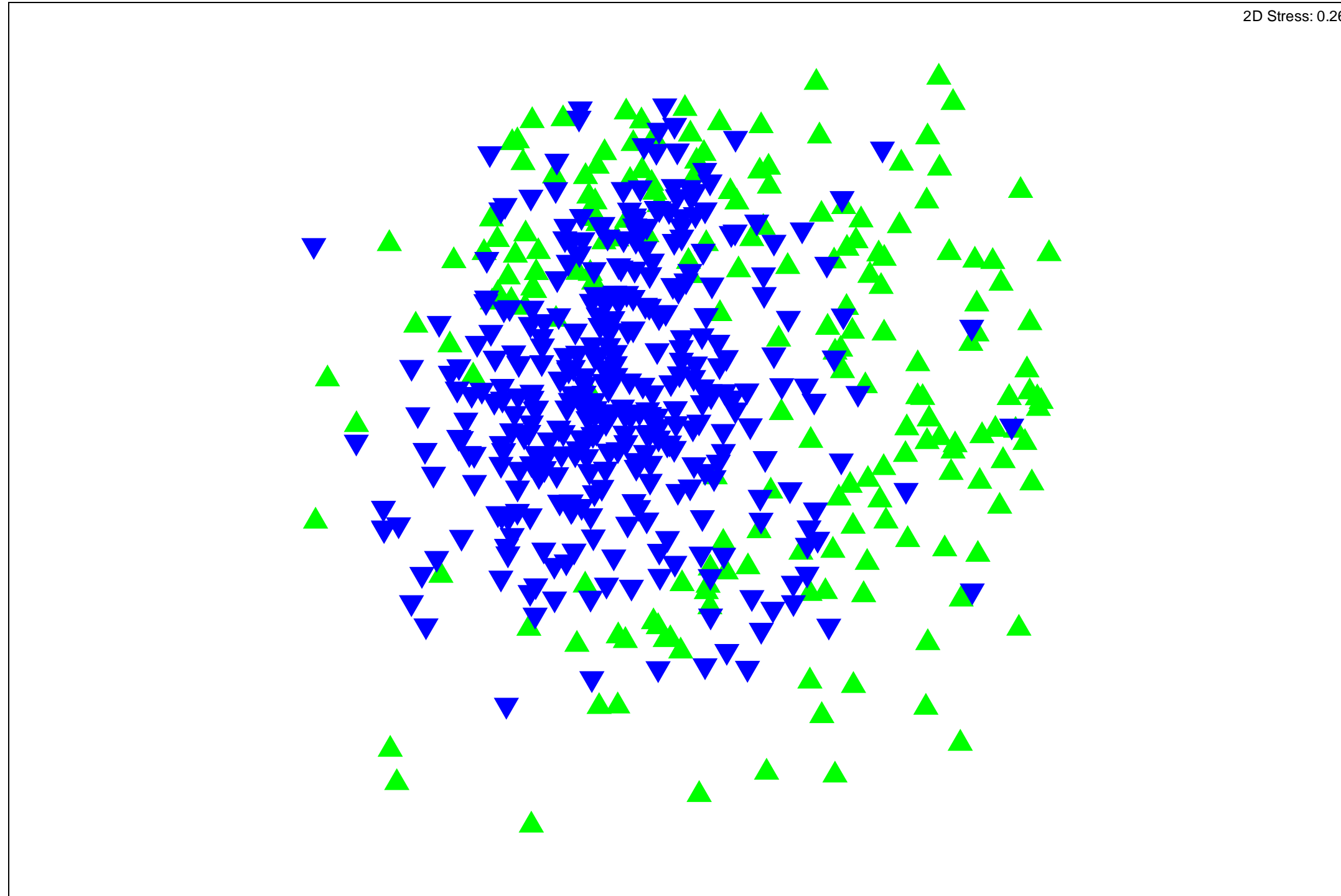
### 3 References

- Astron. 2011. *Hardey Resource Area and Gas Pipeline (Phase 2) Vegetation and Flora Survey*. Consultants report in prep.
- Clarke, K.R. and Green, R.H. 1988. Statistical design and analysis for a 'biological effects' study. *Marine Ecology Progress Series* 92: 205-219.
- Clarke, K.R. and Gorley, R.N. 2006. PRIMER v6. User Manual. PRIMER-E: Plymouth, UK.
- Clarke, K.R. and Warwick, R.M. 2001. *Change in Marine Communities: An Approach to Statistical Analysis and Interpretation*. 2<sup>nd</sup> Edition. Primer-E Ltd. Plymouth.

Transform: Presence/absence  
Resemblance: S17 Bray Curtis similarity

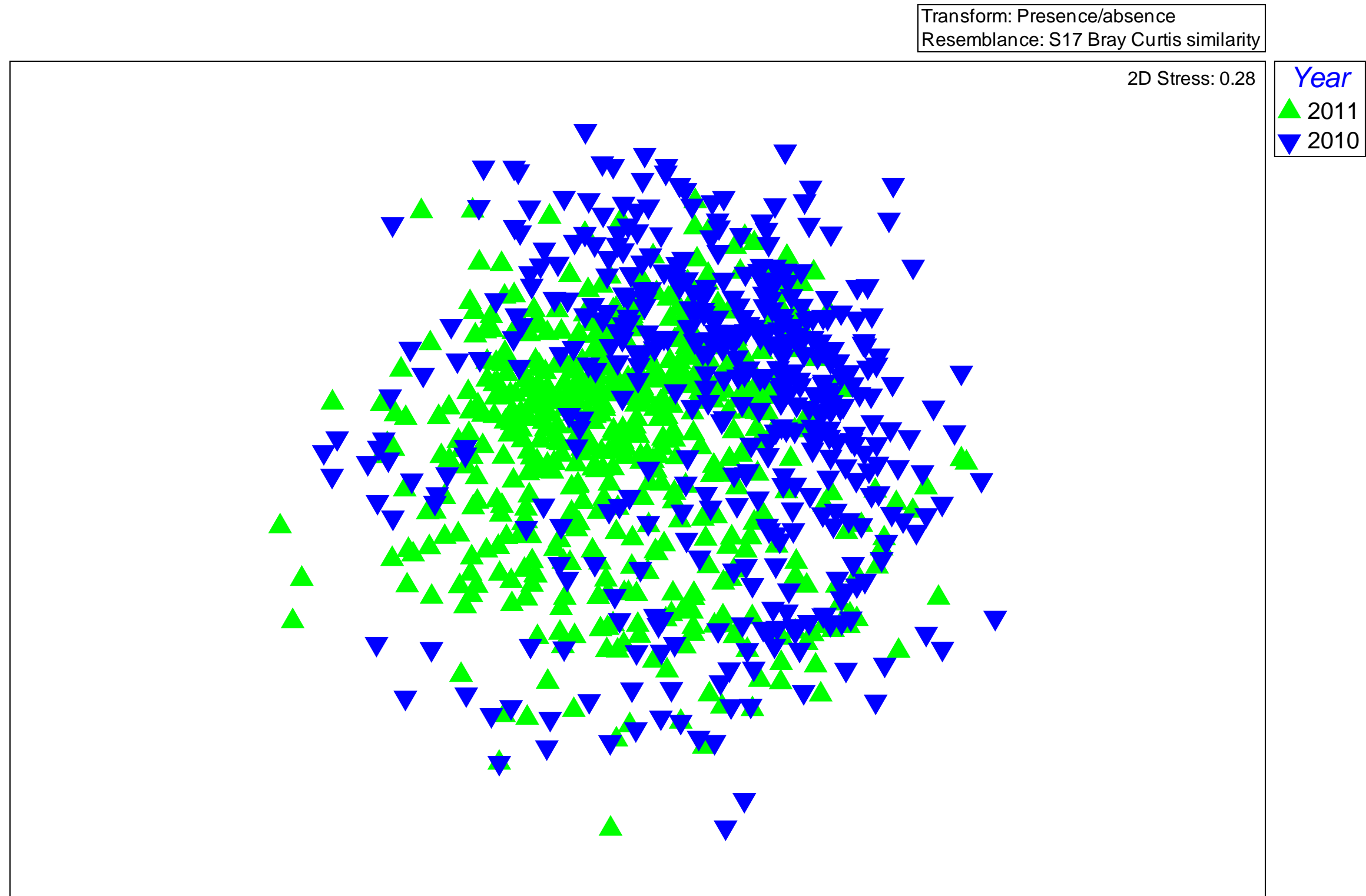
2D Stress: 0.26

*Position*  
▲ Outside alignment  
▼ Inside alignment



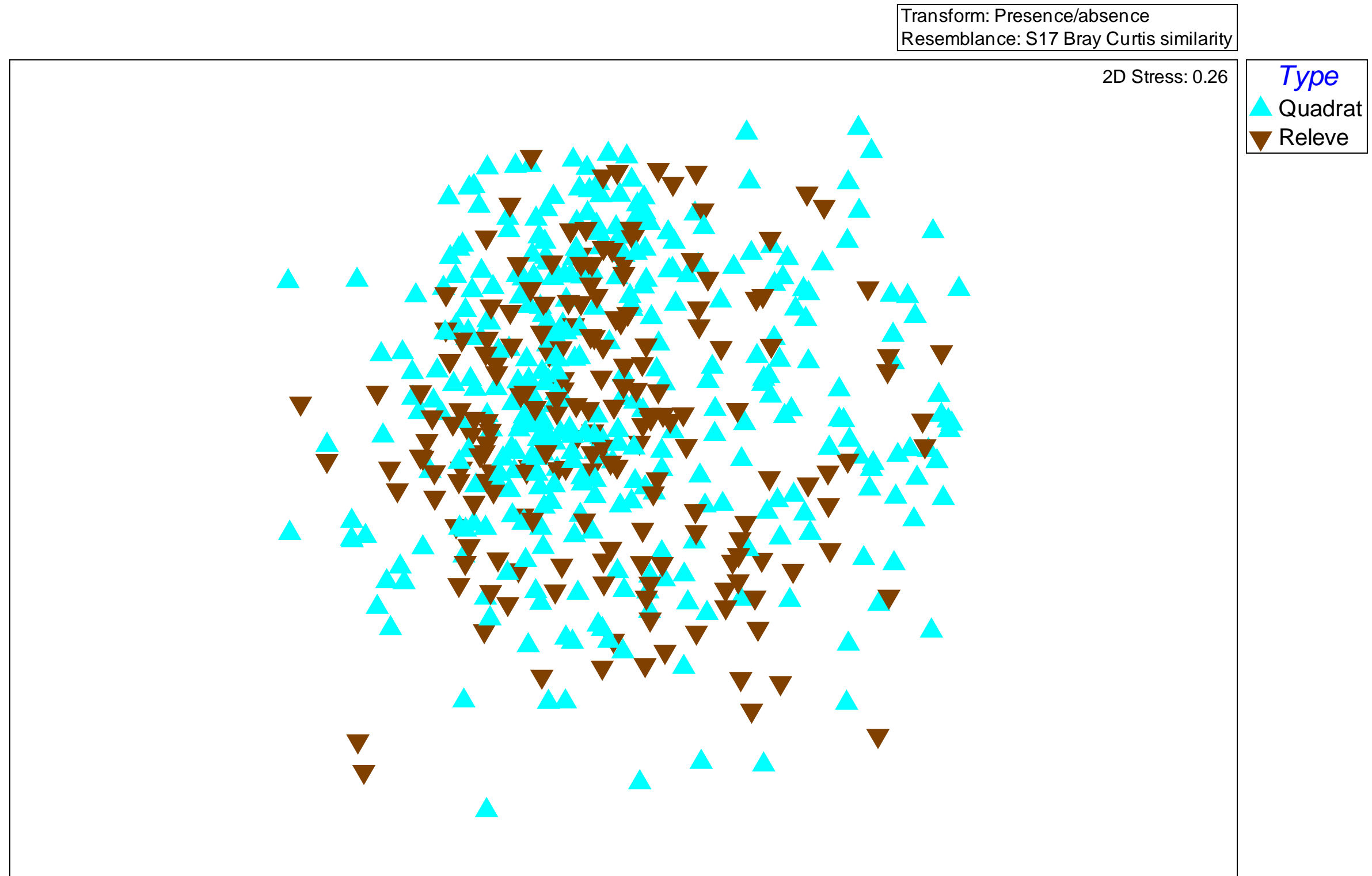
2011 Inside and Outside Project area (All 2011 Samples)  
ANOSIM (Position)  
Sample statistic (Global R): 0.354  
Significance level of sample statistic: 0.1%

Figure F.1: Ordination Plot showing the relationship between all Survey Sites coded by the Position of the quadrat.



2010 & 2011 All Samples  
ANOSIM (Year)  
Sample statistic (Global R): 0.21  
Significance level of sample statistic: 0.1%

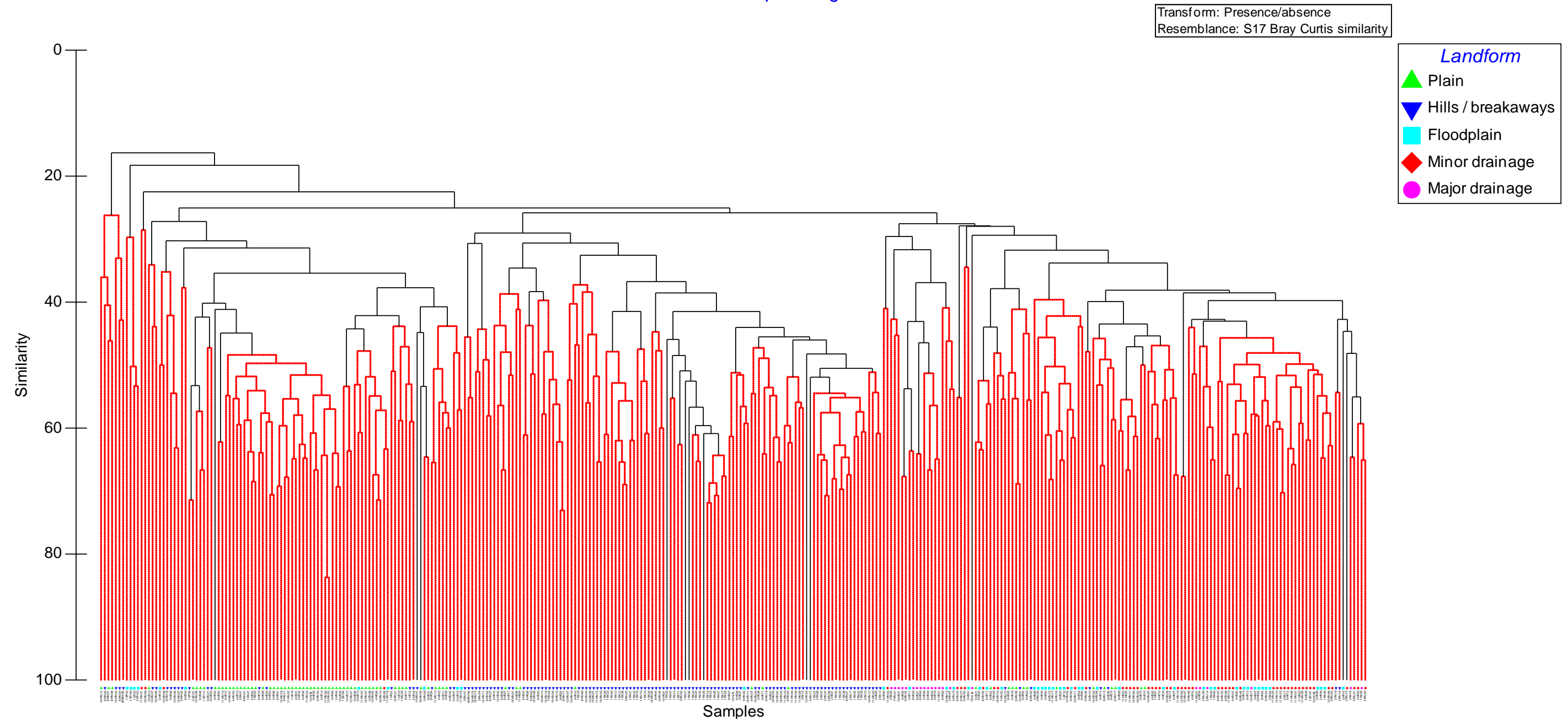
Figure F.2: Ordination Plot Showing the Relationship between all Survey Sites coded by the Year Surveyed.



2011 All Samples  
ANOSIM (Type)  
Sample statistic (Global R): 0  
Significance level of sample statistic: 50.2%

Figure F.3: Ordination Plot showing the relationship between all Quadrats and Relevés.

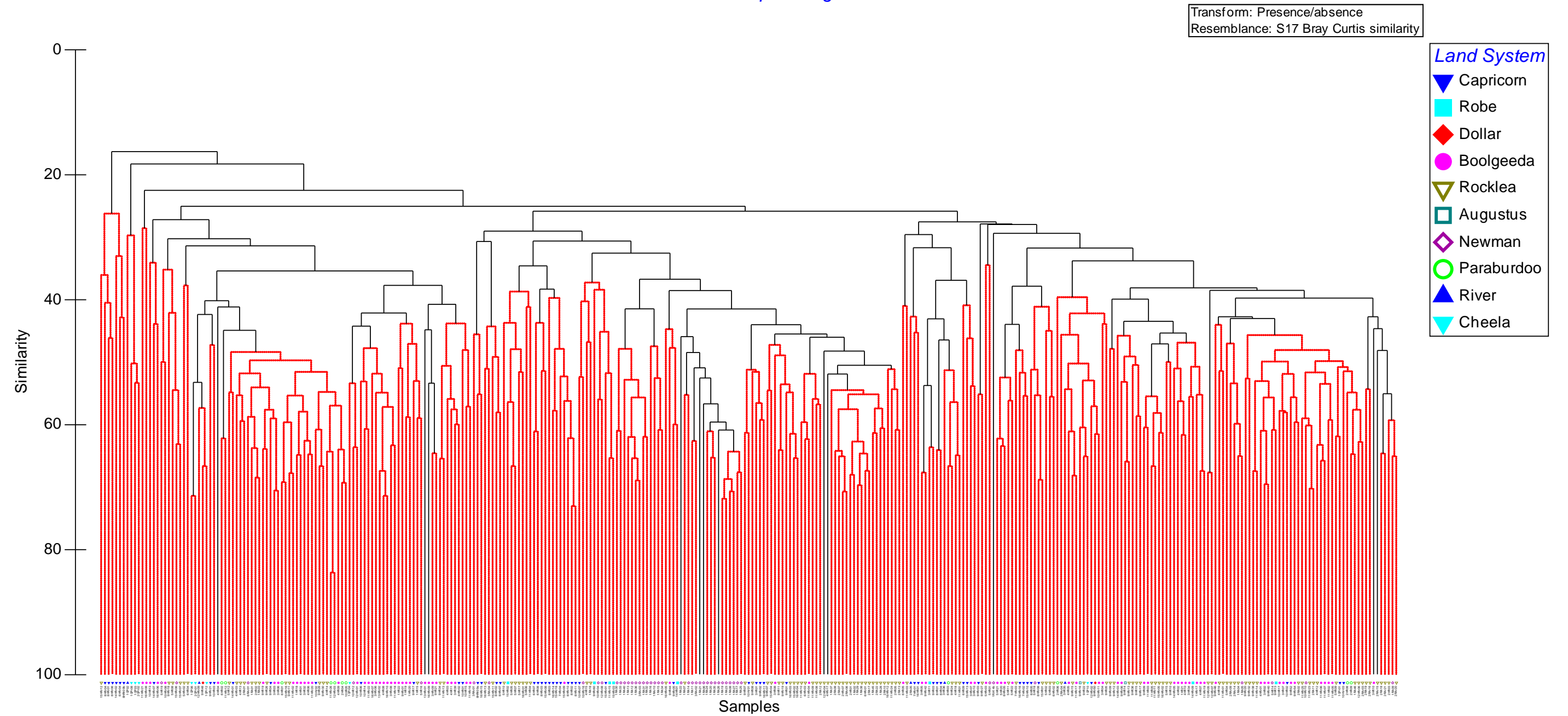
Group average



2011 Inside Project area (Coded by Landform)  
345 Samples  
59 groups  
12 ungrouped quadrats (Outliers)  
SIMPROF  
Sample statistic (Pi): 4.25  
Significance level of sample statistic: 0.5%

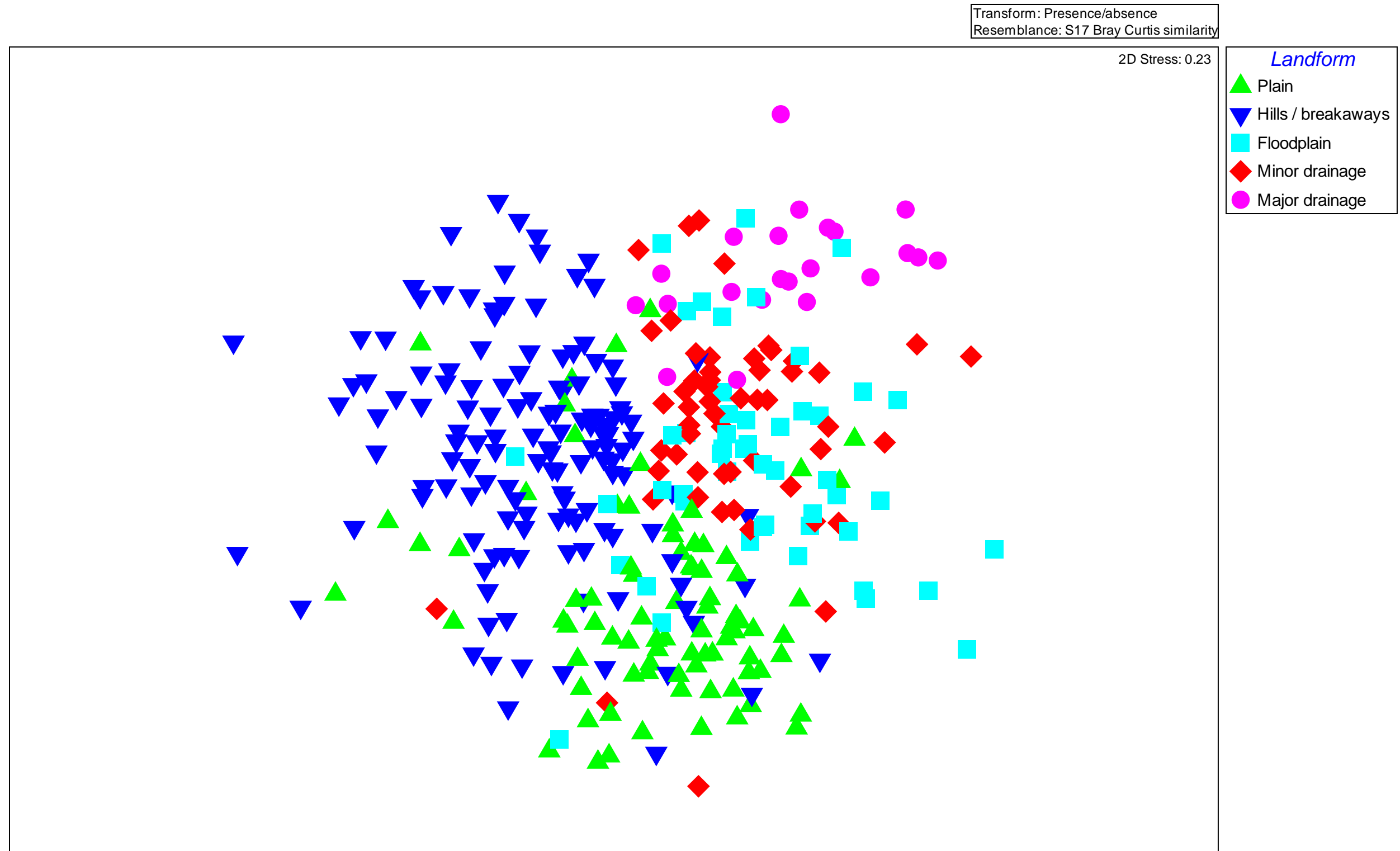
Figure F.4: Dendrogram showing Survey Site groupings using Similarity Profile Analysis and Landform labels for the local scale analysis of the HRA, HRC, and HGP for 2011 data (inside project area).

Group average



2011 Inside Project area (Coded by Landform)  
 345 Samples  
 59 groups  
 12 ungrouped quadrats (Outliers)  
 SIMPROF  
 Sample statistic (Pi): 4.25  
 Significance level of sample statistic: 0.5%

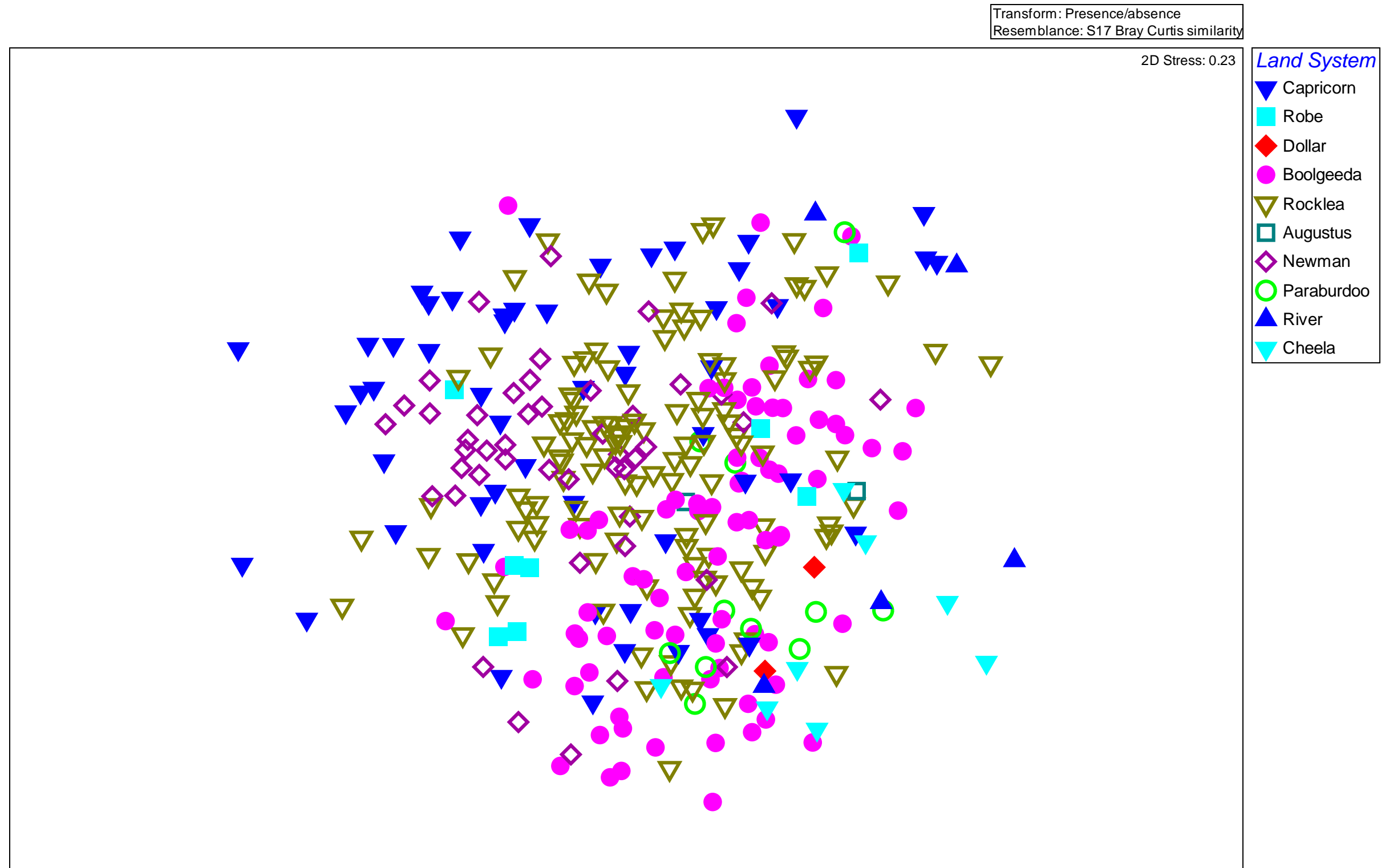
Figure F.5: Dendrogram showing Survey Site groupings using Similarity Profile Analysis and Land System labels for the local scale analysis of the HRA, HRC, and HGP for 2011 data (inside project area).



2011 Inside Project area  
ANOSIM (Landform)  
Sample statistic (Global R): 0.369  
Significance level of sample statistic: 0.1%

Figure F.6: Ordination Plot showing the relationship between all survey sites coded by the Landform in which they occur.

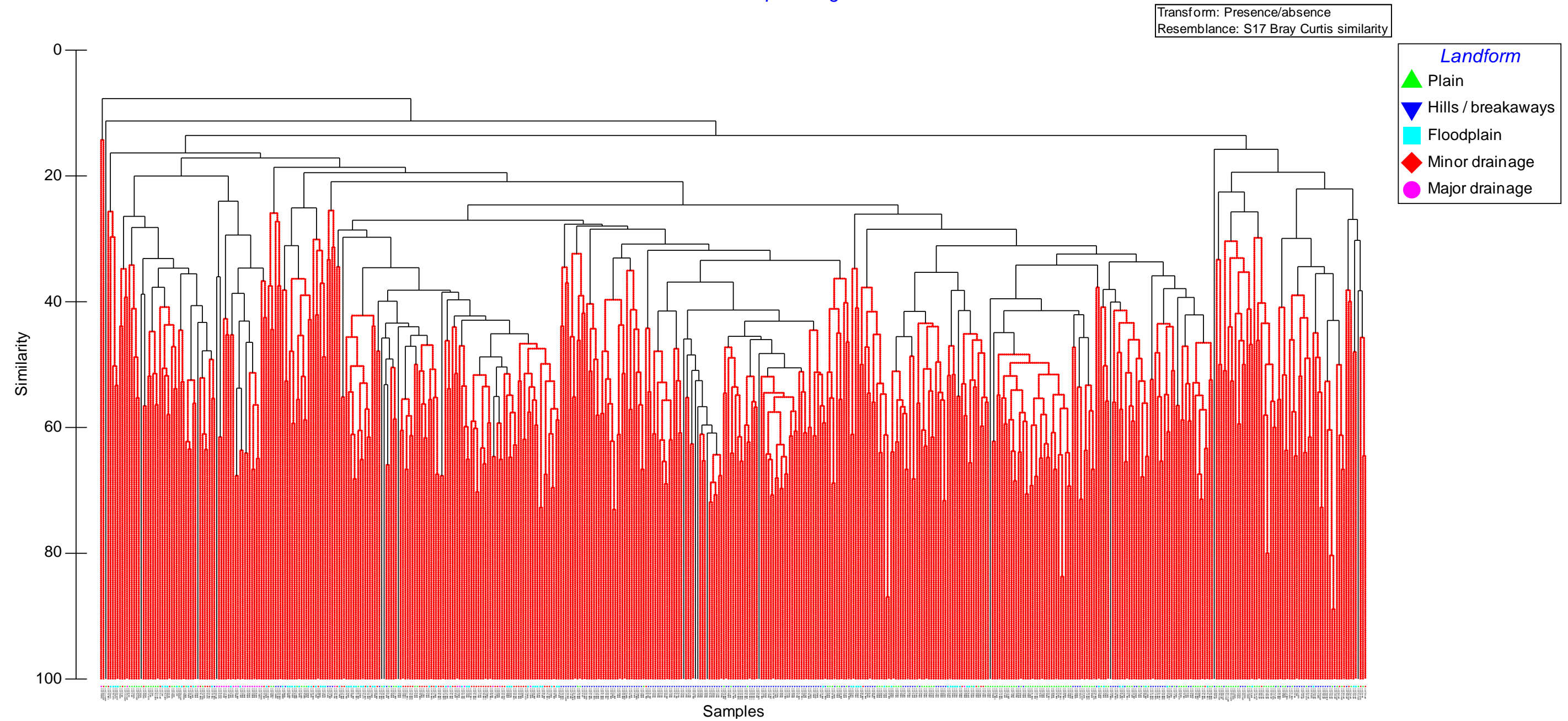




2011 Inside Project area  
ANOSIM (Land System)  
Sample statistic (Global R): 0.237  
Significance level of sample statistic: 0.1%

Figure F.7: Ordination Plot showing the relationship between all survey sites coded by the Land System in which they occur.

Group average



2011 Inside and Outside Project area (Coded by Landform)  
 537 Samples  
 92 groups  
 16 ungrouped quadrats  
 SIMPROF  
 Sample statistic (Pi): 4.666  
 Significance level of sample statistic: 0.5%

Figure F.8: Dendrogram showing Survey Site groupings using Similarity Profile Analysis and Landform labels for the regional analysis of the HRA, HRC, and HGP for 2011 data (inside and outside project area).

## **Appendix G: Protected Mattes, TEC, DRF and Priority Flora Database Search Results**

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Department of  
**Environment and Conservation**

*Our environment, our future*



Your Ref: **12005a-10**  
Our Ref: **36-1210**  
Enquiries: Joshua Gilovitz  
Phone: (08) 9334 0123  
Fax: (08) 9334 0278  
Email: [joshua.gilovitz@dec.wa.gov.au](mailto:joshua.gilovitz@dec.wa.gov.au)

**Astron Environmental Services**  
PO Box 426  
Leederville, WA 6903

Attention: Raimond Orifici

Dear Mr Orifici,

**REQUEST FOR RARE FLORA INFORMATION**

I refer to your request of 17 December 2010 for Threatened Flora information in the Rocklea station area. The search was conducted within a 50 km radius of the point you specified.

A search was undertaken for this area of **(1)** the Department's *Threatened (Declared Rare) Flora* database (for results, *if any*, see "DEFL" – coordinates are GDA94), **(2)** the *Western Australian Herbarium Specimen* database for priority species opportunistically collected in the area of interest (for results, *if any*, see "WAHERB"- coordinates are GDA94 – see condition number 9 in the attached 'Conditions in Respect of Supply' and **(3)**, the Department's *Declared Rare and Priority Flora List* [this list is searched using 'place names'. This list which may also be used as a species target list, contains species that are declared rare (Conservation Code R or X for those presumed to be extinct), poorly known (Conservation Codes 1, 2 or 3), or require monitoring (Conservation Code 4) – for results, *if any*, see "DP List"]. The results are attached electronically to this email.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the seventh point, which refers to the requirement to undertake field investigations for the accurate determination of rare flora occurrence at a site. *The information supplied should be regarded as an indication only of the rare flora that may be present and may be used as a target list in any surveys undertaken.*

The information provided does not preclude you from obtaining and complying with, where necessary, land clearing approvals from other agencies.

An invoice for \$300 (plus GST) to supply this information will be forwarded.

It would be appreciated if any populations of rare flora you encounter in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss rare flora management, please contact Dr Ken Atkins, Manager, Species and Communities Branch, on (08) 9334 0455.

Yours faithfully

Joshua Gilovitz

.....  
for Keiran McNamara  
DIRECTOR GENERAL

27 January 2012

**Please note:** Coordinates supplied for all data search requests must be provided in decimal degrees or degrees minutes seconds format. UTM ('eastings and northings') coordinates are no longer suitable. Thank you.

**Species and Communities Branch**

17 Dick Perry Ave, Technology Park, Kensington  
Phone: (08) 9334 0455 Fax: (08) 9334 0278

Locked Bag 104, Bentley Delivery Centre, Bentley, Western Australia 6983

[www.dec.wa.gov.au](http://www.dec.wa.gov.au)

# DEPARTMENT OF ENVIRONMENT AND CONSERVATION

## RARE FLORA INFORMATION

### CONDITIONS IN RESPECT OF SUPPLY OF INFORMATION

1. All requests for data to be made in writing to the Director General, Department of Environment and Conservation, Attention: Threatened Flora Database Officer, Species and Communities Branch.
2. The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided, without the prior written consent of the Director General, Department of Environment and Conservation.
3. Specific locality information for Declared Rare Flora is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for DRF may not be used in public reports without the written permission of the Director General, Department of Environment and Conservation. Publicly available reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Department is to be contacted for guidance on the presentation of rare flora information.
4. Note that the Department of Environment and Conservation respects the privacy of private landowners who may have rare flora on their property. Rare flora locations identified in the data as being on private property should be treated in confidence, and contact with property owners made through the Department of Environment and Conservation.
5. Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data provided, they may be present. The Department of Environment and Conservation accepts no responsibility for this.
6. Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.
7. **It should be noted that the supplied data do not necessarily represent a comprehensive listing of the rare flora of the area in question. Its comprehensiveness is dependant on the amount of survey carried out within the specified area. The receiving organisation should employ a botanist, if required, to undertake a survey of the area under consideration.**
8. Acknowledgment of the Department of Environment and Conservation as source of the data is to be made in any published material. The unique reference number that is given upon the request for information should be quoted. Copies of all such publications are to be forwarded to the Department of Environment and Conservation, Attention: The Manager, Species and Communities Branch.
9. The development of the PERTH Herbarium database was not originally intended for electronic mapping (eg. GIS ArcView). The latitude and longitude coordinates for each entry are not verified prior to being databased. It is only in recent times that collections have been submitted to PERTH with GPS recorded in latitude and longitude coordinates. Therefore, be aware when using this data in ArcView that some records may not plot to the locality description given with each collection.

#### Species and Communities Branch

17 Dick Perry Ave, Technology Park, Kensington

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Locked Bag 104, Bentley Delivery Centre, Bentley, Western Australia 6983

[www.dec.wa.gov.au](http://www.dec.wa.gov.au)

THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DECLARED RARE AND PRIORITY FLORA LIST

for Western Australia

CONSERVATION CODES

R: Declared Rare Flora - Extant Taxa

**Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.**

X: Declared Rare Flora - Presumed Extinct Taxa

**Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.**

1: Priority One - Poorly known Taxa

**Taxa which are known from one or a few (generally <5) populations which are under threat**, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

2: Priority Two - Poorly Known Taxa

**Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat** (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

3: Priority Three - Poorly Known Taxa

**Taxa which are known from several populations, and the taxa are not believed to be under immediate threat** (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

4: Priority Four - Rare Taxa

**Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors.** These taxa require monitoring every 5-10 years.

Note, the need for further survey of poorly known taxa is prioritised into the three categories depending on the perceived urgency for determining the conservation status of those taxa, as indicated by the apparent degree of threat to the taxa based on the current information.

**Species and Communities Branch**

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**DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DECLARED RARE AND PRIORITY FLORA LIST  
16 September 2010**

SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
<i>Acacia bromilowiana</i>	4	P	Tom Price, Balfour Downs Stn, West Angelas, Hope Downs, Hamersley Ranges, Marillana Stn, Ophthalmia Range	Jul-Aug
<i>Acacia daweara</i>	3	P	Hamersley Range, Karijini N.P.	Jul
<i>Acacia effusa</i>	3	P	Mt Bruce, Hamersley Ra., Karijini N.P., Juna Downs	
<i>Acacia subtiliformis</i>	3	P	Hamersley Ranges, Hancock Range, Ophthalmia Range, Hope Down North, Marillana Stn	Jul, Aug
<i>Adiantum capillus-veneris</i>	2	P, SW	Hamersley Range, Karijini N.P., Peppermint Grove	
<i>Adiantum hispidulum</i>	2	K, P	Purnululu N.P., Hamersley Range, Karijini N.P.	
<i>Aluta quadrata</i>	1	P	Mt Channar, Paraburdoo	May-Jun
<i>Ampelopteris prolifera</i>	3	P, K	Barlee Range N.R., Doongan Stn, Karijini N.P., Prince Regent River	
<i>Aristida calycina</i> var. <i>calycina</i>	2	P, *	Karijini N.P., Eastern States	
<i>Aristida lazaridis</i>	2	P, *	Karijini N.P., Queensland	
<i>Barbula ehrenbergii</i>	1	P, *	Dale's Gorge, Hamersley Range	
<i>Bothriochloa decipens</i> var.	1	P, *	Hamersley Range, Queensland	
<i>Brachyscome</i> sp. Wanna Munna Flats (S. van Leeuwen 4662)	1	P	Tom Price, Newman	July, Sep
<i>Calotis latiuscula</i>	3	P, GLD	Giles, Warburton, Blackstone Range, Rawlinson Range, Hamersley Range	
<i>Calotis squamigera</i>	1	P, *	Wittenoom, Hamersley Range	
<i>Cladium procerum</i>	2	P	Karijini N.P., Millstream-Chichester N.P.	Nov
<i>Dampiera anonyma</i> ms	3	P	Mt Bruce, Mt Nameless, Hamersley Ranges, Mt Sheila, Karijini NP	Jun-Aug
<i>Dampiera metallorum</i> ms	3	P	Hamersley Range, Mt Meharry, West Angelas, Karijini NP	Sep
<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109)	1	P	Hamersley Range	Sep
<i>Eremophila forrestii</i> subsp. <i>Pingandy</i> (M.E. Trudgen 2662)	2	P	Karijini NP, Hamersley Range NP, Turee Creek Stn	May-Jul
<i>Eremophila forrestii</i> subsp. <i>viridis</i>	3	P	Hamersley Range, Onslow, Canning Stock Route	Aug
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	4	P	Hamersley Ranges, Tom Price, Marandoo, Wittenoom	Jul-Sep
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	3	P	Hamersley Ranges, Newman, Marandoo	Jul-Sep
<i>Eremophila shonae</i> subsp. <i>diffusa</i>	3	P, GLD, MW	Doolgunna Stn, Carnarvon Range, Nambi Stn, Yarlalweelor Stn, Paraburdoo	Sep-Oct
<i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4086)	1	P	West Angela Hill, Ophthalmia, Hamersley Range	Sep-Oct
<i>Eremophila</i> sp. Snowy Mountain (S. van Leeuwen 3737)	1	P	Hamersley Range	
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	4	P, MW	S Cape Range, Roy Hill, N Mt Vernon, Paraburdoo, Muggon Stn	Mar, Jun
<i>Eriachne</i> sp. Dampier Peninsula (K.F. Kenneally 5946)	3	K, P	Karijini N.P., Dampier Peninsula, King Hall Is.	Mar-Apr



**DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DECLARED RARE AND PRIORITY FLORA LIST  
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SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
<i>Eucalyptus lucens</i>	1	P	Hamersley Range	
<i>Euphorbia</i> sp. Mt Bruce Flats (S. van Leeuwen 3861)	2	P	Karijini NP	
<i>Euphorbia stevenii</i>	3	P,K	Karijini N.P., Kununurra	
<i>Fimbristylis sieberiana</i>	3	P,K	Hamersley Range, Millstream, Fitzroy Crossing, King Leopold Range, Halls Creek, Little Sandy Desert	-
<i>Geijera salicifolia</i>	3	P,*	Mt Samson, Mt Howieson, Tom Price, Hamersley Ranges, Qld, NT	
Genus sp. Hamersley Range hilltops (S van Leeuwen 4345)	1	P	Hamersley Range	-
<i>Indigofera gilesii</i> subsp. <i>gilesii</i>	3	P,MW	Hamersley Range, Meekatharra, West Angelas	May,Aug
<i>Indigofera ixocarpa</i>	2	P	Marandoo, Tom Price, Nullagine, Karijini NP	Mar,May
<i>Indigofera</i> sp. Bungaroo Creek (S. van Leeuwen 4301)	3	P	Hamersley Range, Tom Price	Jul
<i>Iotasperma sessilifolium</i>	3	P	Ethel Creek Stn, Coolawanya Stn, Juna Downs Stn, Hamersley Range	Jul-Sep
<i>Isotropis parviflora</i>	2	P,K	East Angelas, Karijini N.P., Tanami Desert	Feb-Mar, May
<i>Lepidium catapycnon</i>	R	P	Wittenoom Gorge, Hamersley Range, Weeli Wolli, Newman	Oct-Jan?
<i>Nicotiana umbratica</i>	3	P	Newman, Karijini N.P., Marble Bar, Woodstock, Abydos	Apr, Jun, Sept
<i>Oldenlandia</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	3	P	Millstream-Chichester N.P., Hamersley Range, Caoolawanyah Stn	Mar-May, Jul
<i>Olearia mucronata</i>	3	P,GLD	Hamersley and Chichester Range area, West Angelas, Paraburdoo, Mt Margaret, Mt Keith, Wiluna	Aug-Jan
<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	2	P	Karijini N.P., Hamersley Range	May
<i>Pilbara trudgenii</i>	2	P	Hamersley Range	Sep-Oct
<i>Polymeria distigma</i>	3	P,K	Hamersley Stn, Anna Plains Stn, Great Sandy Desert, Dampier Downs Stn, Tom Price	Jul-Sep
<i>Ptilotus crosslandii</i>	3	MW,P	Meekatharra, Dalgety Downs, Paraburdoo, Glenburgh	Sep
<i>Ptilotus subspinescens</i>	3	P	Brockman, Rocklea Stn, Hamersley Stn	
<i>Ptilotus trichocephalus</i>	4	P,MW	Mt James Stn, Paraburdoo	Sep
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	3	P	Hamersley Ranges	
<i>Rhynchosia bungarensis</i>	4	P	Hamersley Ranges, Chichester Ranges, Yardie Creek, Robe River, Tom Price, Ashburton, East Lewis Island, Burrup Peninsula, Dampier Archipelago	May-Dec
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	3	P	Hamersley Ranges	
<i>Scaevola</i> sp. Hamersley Range basalts (S. van Leeuwen 3675)	2	P	Hamersley Range	
<i>Sida</i> sp. Barlee Range (S van Leeuwen 1642)	3	P	Barlee Range, Turee Creek, Paraburdoo, Hamersley Range	Aug

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SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
Sida sp. Hamersley Range (K. Newbey 10692)	1	P	Hamersley Range, Lawloit Range	
Spartothamnella puberula	2	P	Mt Bruce, Hamersley Range, West Angelas, NT	-
Swainsona sp. Hamersley Station (A.A. Mitchell 196)	3	P	Tom Price, Coolawanya, Millstream, Karijin NP, Hamersley Stn	Mar, Aug-Sep
Tetratheca fordiana ms	1	P	West Angelas, Hamersley Range	Sep
Thryptomene wittweri	R	MW,P,GLD	Hamersley Range, Mt Augustus, Carnarvon Range, White Cliffs Stn, NT	Aug-Oct
Triodia sp. Mt. Ella (ME Trudgen 12739)	3	P	Hamersley Range, Mt Ella	
Triodia sp. Robe River (M.E. Trudgen et al. MET 12367)	3	P	Yarraloola Stn, Yalleen Stn., Red Hill Stn., Mt Stuart Stn., Hamersley Range	
Vigna sp. Central (M.E. Trudgen 1626)	2	P	Karijini N.P., Nyang Stn, Warrawagine Stn	May-Jun, Oct
Vittadinia sp. Coondewanna Flats (s. van Leeuwen 4684)	1	P	Hamersley Range	Jul

**ABBREVIATIONS USED IN THREATENED FLORA DATABASE PRINTOUTS**

**VESTING**

AAP Aboriginal Planning Authority  
 AGR Chief Executive, Dep. of Agriculture  
 ALT Aboriginal Land Trust  
 APB Agricultural Protection Board of WA  
 BGP Botanical Gardens & Parks Authority  
 BSA Boy Scouts Association  
 CC Conservation Commission – NPNCA - LFC  
 CGT Crown Grant in Trust  
 COM Commonwealth of Australia  
 CRO Crown Freehold-Govt Ownership  
 CRW Crown  
 DAG Dep. of Agriculture  
 DOW Dep. of Water  
 DPI Dep. of Planning & Infrastructure  
 EXD Exec Direc CALM  
 FES Fire and Emergency Services Aust.  
 HOW Dep. of Housing/State Housing Commission  
 ILD Industrial Lands Develop. Auth  
 LAC LandCorp  
 MAG Minister for Agriculture  
 MBC Metropolitan Cemeteries Board  
 MED Ministry of Education  
 MHE Minister for Health  
 MIN Minister for Mines  
 MPL Ministry for Planning  
 MPR Minister for Prisons  
 MRD Main Roads WA  
 MTR Minister for Transport  
 MWA Minister for Water Resources  
 MWO Minister for Works  
 NAT Natural Trust of Australia WA  
 NON Not Vested  
 PLB Pastoral Lands Board  
 PRI Private/Freehold  
 RAI Public Transport Authority  
 REL Religious Organisation  
 SEC Synergy (ex Western Power)  
 SHI Shire  
 SPC State Planning Commission  
 SWA State of Western Australia  
 TEL Telstra  
 UNK Unknown  
 WAT Water Corporation  
 WEL Minister Community Welfare  
 WRC Water & Rivers Commission  
 XPL Ex-Pastoral Lease

**PURPOSES**

ABR Aboriginal Reserve  
 ACC Access Track  
 AER Aerodrome  
 AIR Airport  
 ARS Agricultural Research Station  
 BAP Baptist Union of WA  
 CAM Camping  
 CAR Caravan park  
 CEM Cemetery  
 CFA Conservation of Fauna  
 CFF Conservation Of Flora & Fauna  
 CFL Conservation of Flora  
 CHU Church  
 CPK Car Park  
 CMN Communications  
 COM Common

CON Conservation Park  
 DEF Defence  
 DRA Drain  
 EDE Educational Endowment  
 EDU Educational purposes UWA  
 ENE Enjoyment of Natural Environ.  
 EXC Excepted from sale  
 EXL Exploration Lease  
 EXP Experimental Farm  
 FIR Firing Range  
 FOR State Forest  
 GE General Lease  
 GHA Grain Handling  
 GOL Golf  
 GRA Gravel Pit  
 GVT Government Requirements  
 HAR Harbour Purposes  
 HEP Heritage Purposes  
 HER Heritage trail  
 HOS Hospital  
 KEN Kennels  
 LPR Landscape Protection  
 MIN Mining lease  
 MUN Municipal Purposes  
 NPK National Park  
 NRE Nature Reserve  
 OTH Other  
 PAR Parkland (& Recreation)  
 PAS Pastoral lease  
 PFF Protection of Flora & Fauna  
 PFL Protection of Flora  
 PIC Picnic ground  
 PLA Plantation  
 POS Public Open Space  
 PRS Prison site  
 PUR Purchase Lease  
 PUT Public Utility  
 QUA Quarry  
 RAD Radio Station  
 RAC Racecourse  
 REC Recreation  
 REH Rehabilitation/Re-establish Native Plants  
 RRE Railway Reserve  
 RUB Rubbish  
 SAN Sand  
 SCH School-site  
 SET Settlers requirements  
 SHI Shire Requirements  
 SHO Showgrounds  
 SNN Sanitary  
 SOI Soil Conservation  
 STO Stopping place  
 TIM Timber  
 TOU Tourism  
 TOW Town-site  
 TRA Training Ground  
 TRI Trig station  
 UCL Unallocated Crown Land  
 UNK Unknown  
 VER Road Verge  
 VPF Vermin Proof Fence  
 WAT Water  
 WLS Wildlife Sanctuary  
 WOO Firewood

25 January 2011

Hi Raimond,

I refer to your request on the 19<sup>th</sup> of January 2011 for information on threatened and priority ecological communities occurring within a 50km radius of the search area co-ordinates provided in the email below.

A search was undertaken on the Department's Threatened Ecological Communities database. Please note that there are no known occurrences of threatened ecological communities recorded within this boundary.

However, there are occurrences of the following ecological community within a further 25km of your search original 50km search area:

- The 'Vulnerable' threatened ecological community – 'Themeda grasslands on cracking clays (Hamersley Station, Pilbara)'

Please note not all priority ecological communities are currently recorded on our database. You may like to view the current list in related documents at <http://www.dec.wa.gov.au/content/view/849/2017/> .

Attached are the conditions under which this information has been supplied. The information supplied should be regarded as an indication only of the threatened and priority ecological communities that may be present.

It would be appreciated if any occurrences of threatened and priority ecological communities encountered by you in the area could be reported to this Department to ensure their ongoing management.

An invoice for \$220 (including GST) for the supply of this information will be forwarded.

**Your request for information reference number for this search is:** 25-0111. Please quote this unique reference number when acknowledging the Department of Environment and Conservation as a source of the data in any published material.

Regards

Mia

**Mia Podesta**

Ecologist - Threatened and Priority Ecological Communities Database

Part Time: *Mon-Wed*

Department of Environment and Conservation Kensington

Ph : 9334 0116

Fax: 9334 0300



# EPBC Act Protected Matters Report: Coordinates

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

**Report created: 02/11/11 19:03:07**

## [Summary](#)

## [Details](#)

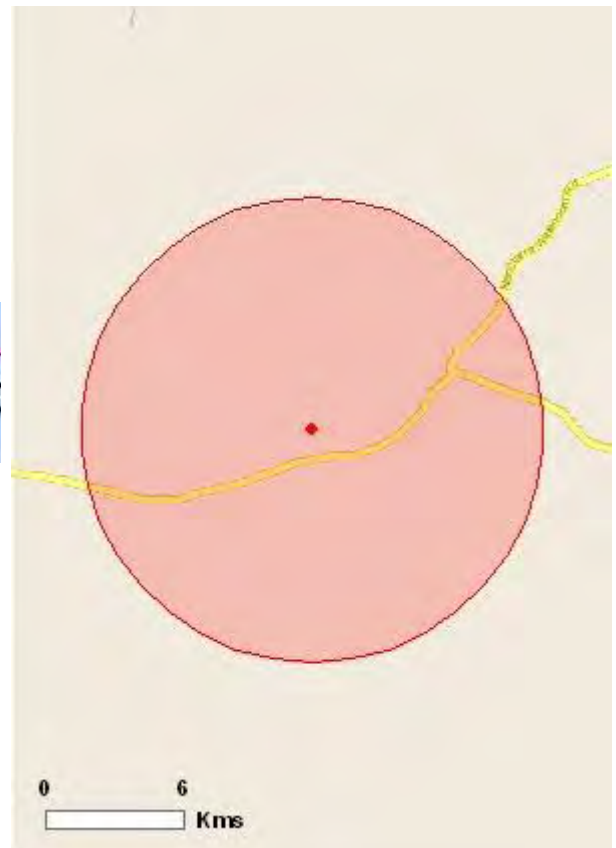
[Matters of NES](#)

[Other matters protected by the EPBC Act](#)

[Extra Information](#)

## [Caveat](#)

## [Acknowledgements](#)



This map may contain data which are  
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Australia), ©PSMA 2010

## [Coordinates](#)

Buffer: 10.0Km

# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see <http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>.

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Significance (Ramsar Wetlands):</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Areas:</a>	None
<a href="#">Threatened Ecological Communities:</a>	None
<a href="#">Threatened Species:</a>	3
<a href="#">Migratory Species:</a>	7

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov.au/epbc/permits/index.html>.

<a href="#">Commonwealth Lands:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	5
<a href="#">Whales and Other Cetaceans:</a>	None

<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves:</a>	None

## Report Summary for Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">Place on the RNE:</a>	None
<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	4
<a href="#">Nationally Important Wetlands:</a>	None

## Details

### Matters of National Environmental Significance

#### Threatened Species [ [Resource Information](#) ]

Name	Status	Type of Presence
<b>MAMMALS</b>		
<a href="#">Dasyurus hallucatus</a>		
Northern Quoll [331]	Endangered	Species or species habitat likely to occur within area
<a href="#">Rhinonicteris aurantia (Pilbara form)</a>		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area

#### REPTILES

<a href="#">Liasis olivaceus barroni</a>		
Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat may occur within area

#### Migratory Species [ [Resource Information](#) ]

Name	Status	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a>		
Fork-tailed Swift [678]		Species or species habitat may occur within area
<a href="#">Ardea alba</a>		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
<a href="#">Ardea ibis</a>		
Cattle Egret [59542]		Species or species habitat may occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Merops ornatus</a>		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Ardea alba</a>		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
<a href="#">Ardea ibis</a>		
Cattle Egret [59542]		Species or species habitat may occur within area

### [Charadrius veredus](#)

Oriental Plover, Oriental  
Dotterel [882]

Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

### Listed Marine Species [\[ Resource Information \]](#)

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Apus pacificus</a>		
Fork-tailed Swift [678]		Species or species habitat may occur within area
<a href="#">Ardea alba</a>		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
<a href="#">Ardea ibis</a>		
Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a>		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a>		
Rainbow Bee-eater [670]		Species or species habitat may occur within area

## Extra Information

### Invasive Species [\[ Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
<b>Mammals</b>		
<a href="#">Felis catus</a>		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<a href="#">Oryctolagus cuniculus</a>		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<a href="#">Vulpes vulpes</a>		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
<a href="#">Cenchrus ciliaris</a>		
Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

## Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of



International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

## **Coordinates**

-22.95278 117.30861

## **Acknowledgements**

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)

- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Last updated: Thursday, 16-Sep-2010 09:13:25 EST

[Department of Sustainability, Environment, Water, Population and Communities](#)

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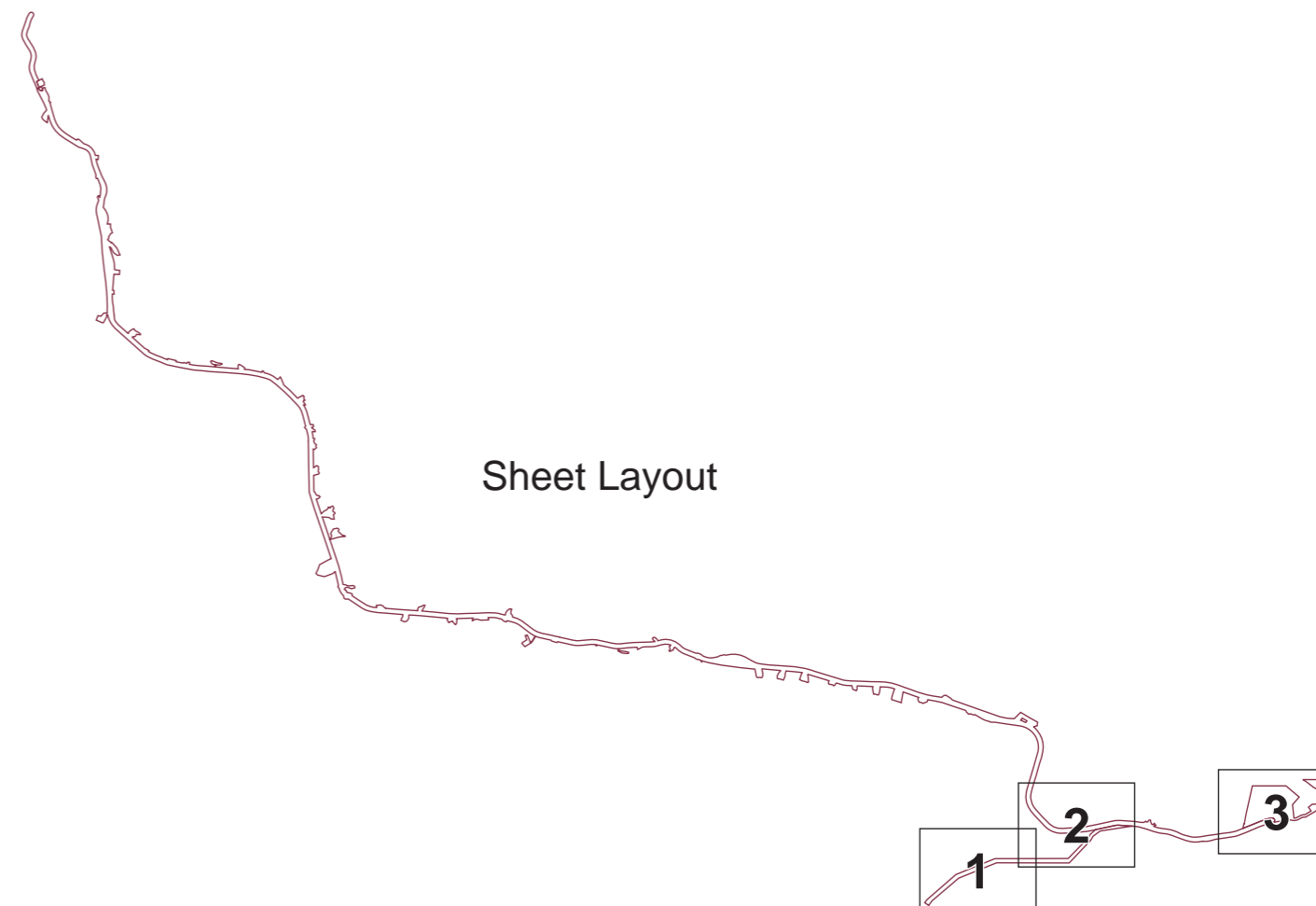
| [Australian Government](#) |

## Appendix H: Vegetation Mapping

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**Vegetation Code Vegetation Association Description**

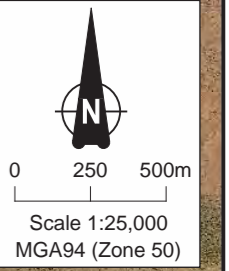
Hi03	<i>Triodia wiseana</i> ( <i>T. angusta</i> ) hummock grassland with <i>Senna</i> spp., <i>Stylobasium spathulatum</i> , <i>Acacia synchronicia</i> scattered shrubs to open shrubland.
Hi04	<i>Acacia</i> spp. and <i>Eremophila</i> spp. open shrubland over <i>Triodia wiseana</i> ( <i>T. angusta</i> ) open hummock grassland and <i>Cymbopogon ambiguus</i> scattered tussock grasses.
Hi08	<i>Acacia aptaneura</i> low open woodland over <i>Senna</i> spp. and <i>Eremophila</i> spp. scattered shrubs to open shrubland over <i>Triodia wiseana</i> ( <i>T. angusta</i> ) very open hummock grassland.
Hi09	<i>Acacia aptaneura</i> , <i>A. pruinocarpa</i> low open woodland to low woodland over <i>Eremophila cryptothrix</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> scattered shrubs to open shrubland over <i>Triodia wiseana</i> scattered hummock grasses to open hummock grassland.
Hi14	<i>Acacia rhodophloia</i> , <i>A. aptaneura</i> tall open shrubland over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> over <i>Triodia wiseana</i> open hummock grassland.
Hi16	<i>Acacia pruinocarpa</i> scattered low trees to low woodland over <i>Acacia marramamba</i> scattered shrubs over <i>Triodia wiseana</i> hummock grassland.
Hi19	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Acacia pruinocarpa</i> scattered low trees to low open woodland over <i>A. marramamba</i> and <i>A. spondylophylla</i> scattered shrubs to open heath over <i>Triodia wiseana</i> hummock grassland.
Hi22	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and/ or <i>Corymbia ferritcola</i> scattered low trees over <i>Dodonaea pachyneura</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> scattered shrubs to open shrubland over <i>Triodia wiseana</i> scattered hummocks to open hummock grassland and <i>Eriachne mucronata</i> scattered tussock grasses.
HBr4	<i>Acacia arida</i> open heath over <i>Triodia wiseana</i> open hummock grassland to hummock grassland.
HBr25	<i>Triodia wiseana</i> hummock grassland.
PI07	<i>Acacia xiphophylla</i> scattered low trees to low woodland over <i>Eremophila cuneifolia</i> scattered shrubs to open shrubland over <i>Triodia epactia</i> scattered hummock grasses and * <i>Cenchrus ciliaris</i> scattered tussock grasses.
PI08	<i>Acacia xiphophylla</i> ( <i>A. aptaneura</i> ) low open woodland to low woodland over <i>Senna</i> spp., <i>Eremophila cuneifolia</i> scattered shrubs to open shrubland over <i>Triodia wiseana</i> scattered hummock grasses to open hummock grassland.
PI10	<i>Acacia xiphophylla</i> ( <i>A. tetragonophylla</i> and/ or <i>A. synchronicia</i> ) low open woodland to low woodland over <i>Senna</i> spp., <i>Eremophila cuneifolia</i> scattered shrubs over <i>Triodia wiseana</i> scattered hummock grasses.
PI11	<i>Acacia xiphophylla</i> ( <i>A. tetragonophylla</i> and/ or <i>A. synchronicia</i> ) low open woodland over <i>Eremophila cuneifolia</i> scattered shrubs.
Ma01	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i> , <i>E. victrix</i> open woodland to woodland over <i>Melaleuca glomerata</i> tall open shrubland over * <i>Cenchrus ciliaris</i> very open tussock grassland to tussock grassland.
Ma03	<i>Acacia citrinoviridis</i> ( <i>Eucalyptus victrix</i> and/ or <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ) low open woodland over <i>Petalostylis labicheoides</i> , <i>Stylobasium spathulatum</i> , <i>A. bivenosa</i> tall shrubland over <i>Triodia angusta</i> , <i>T. wiseana</i> very open hummock grassland and * <i>Cenchrus ciliaris</i> scattered tussock grasses.
Ma04	<i>Melaleuca glomerata</i> low closed forest over <i>Streptoglossa decurrens</i> and <i>Pluchea rubelliflora</i> herbland.
Mi02	<i>Acacia citrinoviridis</i> , <i>A. coriacea</i> subsp. <i>pendens</i> ( <i>Melaleuca glomerata</i> ) low open forest over <i>Triodia wiseana</i> very open hummock grassland and mixed spp. scattered tussock grasses.
Mi05	<i>Acacia aptaneura</i> , <i>A. citrinoviridis</i> , <i>A. kempeana</i> low open woodland to low open forest over * <i>Cenchrus ciliaris</i> scattered tussock grasses to open tussock grassland and <i>Triodia wiseana</i> and/ or <i>T. epactia</i> scattered tussock grasses to open hummock grassland.
Mi06	<i>Acacia citrinoviridis</i> low open woodland to low open forest over * <i>Cenchrus ciliaris</i> open tussock grassland to tussock grassland and <i>Triodia wiseana</i> scattered hummocks.
Mi08	<i>Acacia citrinoviridis</i> , <i>A. aptaneura</i> low woodland to low open forest over <i>Triodia wiseana</i> scattered hummock grasses to hummock grassland and * <i>Cenchrus ciliaris</i> scattered tussock grasses to tussock grassland.
Mi12	<i>Acacia kempeana</i> , <i>A. wanyu</i> tall open shrubland to tall shrubland over * <i>Cenchrus ciliaris</i> scattered tussock grasses to very open tussock grassland and <i>Triodia epactia</i> and/ or <i>T. wiseana</i> scattered hummock grasses to open hummock grassland.
Mi15	<i>Acacia aptaneura</i> and <i>A. kempeana</i> low open woodland to low closed forest over <i>T. wiseana</i> and / or <i>T. epactia</i> open hummock grassland to open hummock grassland and * <i>Cenchrus ciliaris</i> scattered tussock grasses to open tussock grassland.
mDr32	<i>Acacia synchronicia</i> , <i>A. citrinoviridis</i> open shrubland to shrubland over * <i>Cenchrus ciliaris</i> tussock grassland.
mDr36	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i> woodland over <i>E. victrix</i> low woodland over <i>Melaleuca glomerata</i> , <i>M. linophylla</i> and <i>Acacia coriacea</i> subsp. <i>pendens</i> high shrubland over * <i>Cenchrus ciliaris</i> and * <i>C. setiger</i> tussock grassland ( <i>Cyperus</i> spp. very open sedgeland).
Cleared	Cleared land.
—	Survey Boundary
- - -	Borrow Pits
□	Quadrats
○	Relevés



**HARDEY GAS PIPELINE  
AND RESOURCE AREA  
VEGETATION AND FLORA SURVEY  
(PHASE 2)  
LEGEND**

Author: J. Atkinson      Date: January 2012

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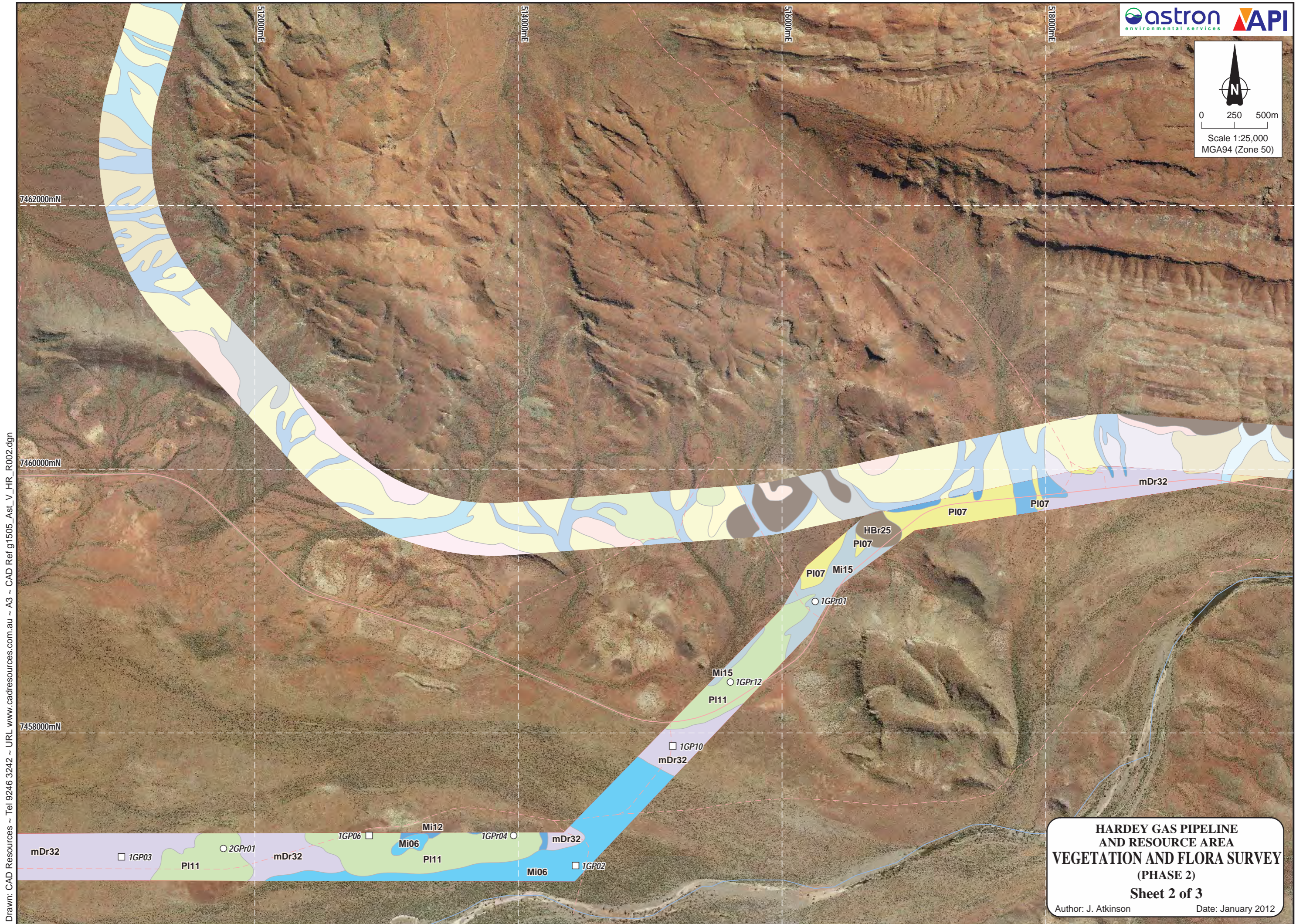
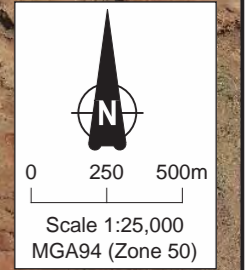


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**HARDEY GAS PIPELINE  
AND RESOURCE AREA  
VEGETATION AND FLORA SURVEY  
(PHASE 2)**  
**Sheet 1 of 3**  
Author: J. Atkinson Date: January 2012

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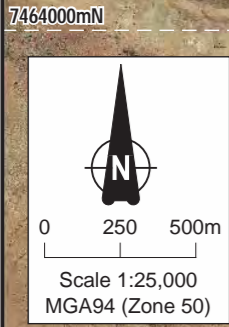




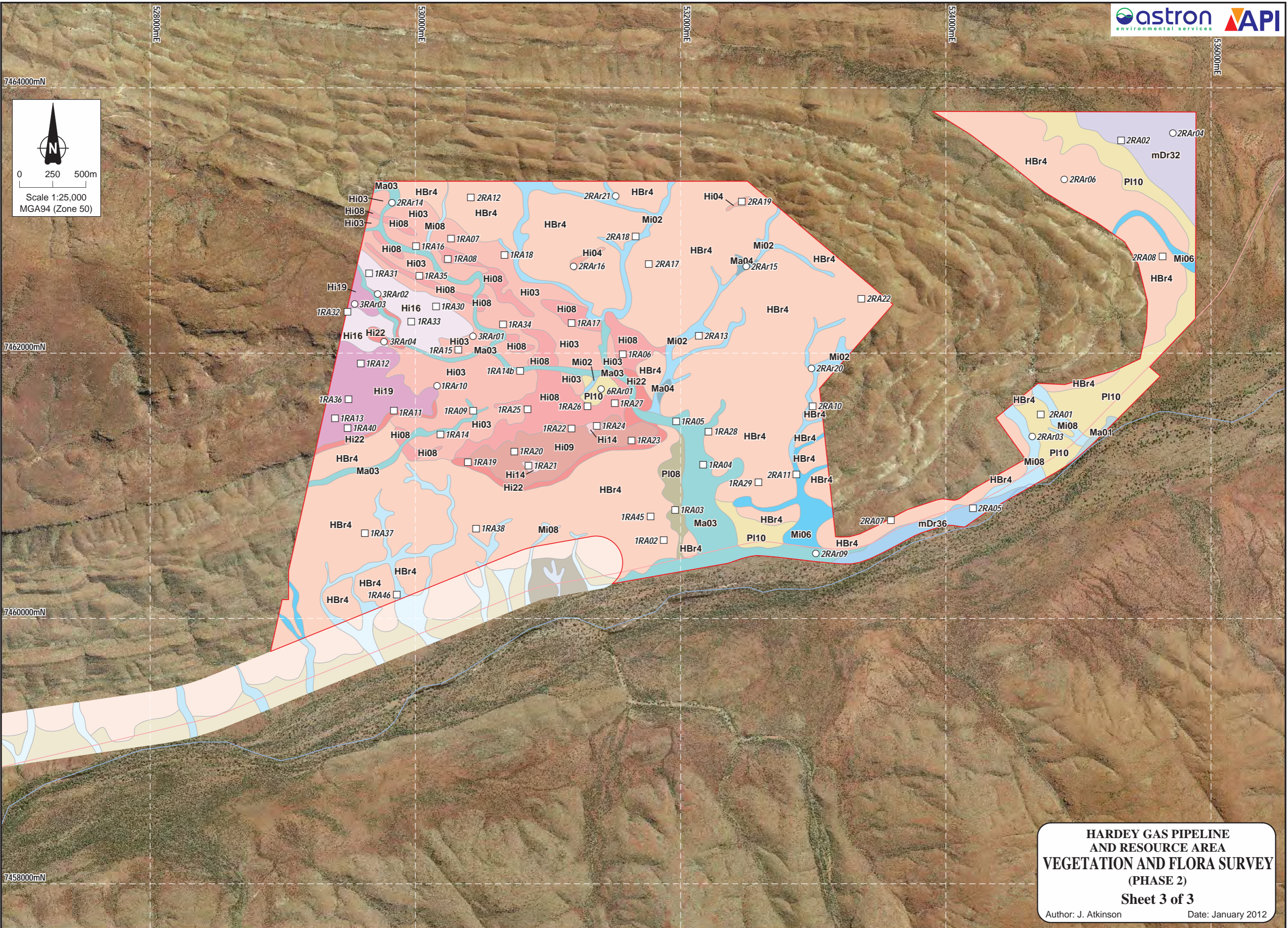
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**HARDEY GAS PIPELINE  
AND RESOURCE AREA  
VEGETATION AND FLORA SURVEY  
(PHASE 2)**  
**Sheet 2 of 3**  
Author: J. Atkinson Date: January 2012

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**HARDEY GAS PIPELINE  
AND RESOURCE AREA  
VEGETATION AND FLORA SURVEY  
(PHASE 2)  
Sheet 3 of 3**  
Author: J. Atkinson Date: January 2012

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## **Appendix I: Relevè and Quadrat Data**

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**API Resource Area****Site 1GP02**

**Location:** Hardey Gas pipeline. Plot east of road between Hardey River and Nanutarra-Paraburdoo highway. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 26/08/2010 **Described by:** BMLK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 2/04/2011 **Described by:** JABV **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 514433 mE **Northing:** 7456995 mN

**Habitat:** Floodplain.

**Soil:** Red sandy soil.

**Rock Type:** River bed rocks.

**Vegetation:** *Acacia citrinoviridis* low open forest over *Eremophila forrestii* ?subsp. scattered shrubs over *\*Cenchrus ciliaris* (*\*C setiger*) tussock grassland.

**Vegetation Code:** Mi06

**Vegetation Desc:** *Acacia citrinoviridis* low open woodland to low open forest over *\*Cenchrus ciliaris* open tussock grassland to tussock grassland and *Triodia wiseana* scattered hummock grasses.

**Veg Condition:** Poor.

**Fire Age:** > 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia citrinoviridis</i>	55	8-10
<i>Aerva javanica</i>	+	0.5
<i>Cenchrus ciliaris</i>	65	0.5
<i>Cenchrus setiger</i>	2	1.0
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.4
<i>Eragrostis</i> sp.	+	0.15
<i>Eremophila forrestii</i> ?subsp.	1	1.6
<i>Goodenia forrestii</i>	+	0.15
<i>Ipomoea muelleri</i>		climber
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus obovatus</i>	+	0.5
<i>Rhagodia eremaea</i>	+	1.3
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.3

**API Resource Area****Site 1GP03**

**Location:** Hardey Gas pipeline. Plot north of track and fence. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 27/08/2010 **Described by:** BVNK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 2/04/2011 **Described by:** ABTDI **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 510988 mE **Northing:** 7457061 mN

**Habitat:** Flat plain.

**Soil:** Orange-brown loam.

**Rock Type:** Very scattered ironstone gravels.

**Vegetation:** *Acacia synchronicia* tall open shrubland over *Scaevola spinescens*, *Rhagodia eremaea* scattered shrubs over \**Cenchrus ciliaris* tussock grassland.

**Vegetation Code:** mDr32

**Vegetation Desc:** *Acacia synchronicia*, *A. citrinoviridis* open shrubland to shrubland over \**Cenchrus ciliaris* tussock grassland.

**Veg Condition:** Poor.

**Fire Age:** 5 - 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia citrinoviridis</i>	+	3.0
<i>Acacia synchronicia</i>	10	4.5
<i>Acacia tetragonophylla</i>	+	3.0
<i>Acetosa vesicaria</i>	+	0.4
<i>Boerhavia coccinea</i>	+	0.15
<i>Cenchrus ciliaris</i>	60	0.6
<i>Cleome viscosa</i>	+	0.05
<i>Corchorus tridens</i>	+	0.2
<i>Eremophila forrestii</i> ?subsp.	+	1.2
<i>Eriachne mucronata</i> (typical form)	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.3
<i>Ptilotus obovatus</i>	+	0.8
<i>Rhagodia eremaea</i>	1	1.6
<i>Scaevola spinescens</i>	1	1.0
<i>Sclerolaena costata</i>	+	0.15
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.8
<i>Sida fibulifera</i>	+	0.2
<i>Sporobolus australasicus</i>	+	0.4



**API Resource Area****Site 1GP06**

**Location:** Hardey Gas pipeline. Plot south of track. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 26/08/2010 **Described by:** BMLK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 2/04/2011 **Described by:** ABTDI **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 512867 mE **Northing:** 7457223 mN

**Habitat:** Low hillslope, hilltop.

**Soil:** Skeletal red-brown clay loam.

**Rock Type:** Various stones including ? basalt.

**Vegetation:** *Acacia xiphophylla* tall open shrubland.

**Vegetation Code:** PI11

**Vegetation Desc:** *Acacia xiphophylla* (*A. tetragonophylla* and/or *A. synchronicia*) low open woodland over *Eremophila cuneifolia* scattered shrubs.

**Veg Condition:** Very good (2010). Excellent (2011).

**Fire Age:** >10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia synchronicia</i>	+	0.8
<i>Acacia tetragonophylla</i>	+	0.6
<i>Acacia xiphophylla</i>	4	2.5
<i>Boerhavia coccinea</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.25
<i>Enneapogon caeruleus</i>	+	0.2
<i>Eremophila cuneifolia</i>	+	0.6
<i>Eriachne mucronata</i> (typical form)	+	0.15
<i>Euphorbia australis</i>	+	0.02
<i>Gomphrena</i> sp.	+	0.04
<i>Hibiscus burtonii</i>	+	0.15
<i>Lepidium platypetalum</i>	+	0.5
<i>Maireana villosa</i>	+	0.4
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.06
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.4
<i>Sclerolaena costata</i>	+	0.2
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.25
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thinly sericeous)	+	0.5
<i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26)	+	1.0
<i>Solanum lasiophyllum</i>	+	0.4
<i>Sporobolus australasicus</i>	+	0.2
<i>Trianthema triquetra</i>	+	0.15
<i>Tribulus suberosus</i>	+	0.2

**API Resource Area****Site 1GP10**

**Location:** Hardey Gas pipeline. South of Nanutarra-Paraburdoo Rd, east of track. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 27/08/2010 **Described by:** BMLK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 1/04/2011 **Described by:** JABV **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 515170 mE **Northing:** 7457902 mN

**Habitat:** Plain.

**Soil:** Red-brown clayey sand.

**Rock Type:** Scattered pebbles.

**Vegetation:** *Acacia citrinoviridis* (*A. synchronicia*) low open woodland over *A. synchronicia*, *A. tetragonophylla* and *Eremophila fraseri* ?subsp. tall open shrubland over \**Cenchrus ciliaris* tussock grassland.

**Vegetation Code:** mDr32

**Vegetation Desc:** *Acacia synchronicia*, *A. citrinoviridis* open shrubland to shrubland over \**Cenchrus ciliaris* tussock grassland.

**Veg Condition:** Poor.

**Fire Age:** > 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia citrinoviridis</i>	3	6.0
<i>Acacia synchronicia</i>	5	4.0
<i>Acacia tetragonophylla</i>	2	2.5
<i>Acacia wanyu</i>	+	1.2
<i>Alysicarpus muelleri</i>	+	0.1
<i>Boerhavia coccinea</i>	+	0.15
<i>Cenchrus ciliaris</i>	65	0.5
<i>Chrysopogon fallax</i>	+	0.3
<i>Cleome viscosa</i>	+	0.1
<i>Corchorus crozophorifolius</i>	+	0.8
<i>Corchorus tridens</i>	+	0.1
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dactyloctenium radulans</i>	+	0.05
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.2
<i>Eragrostis</i> sp.	+	0.05
<i>Eremophila fraseri</i> ?subsp.	3	2.5
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.15
<i>Goodenia forrestii</i>	+	1.0
<i>Hakea lorea</i> subsp. <i>lorea</i>	+	5.0
<i>Polycarpaea corymbosa</i>	+	0.1
<i>Portulaca oleracea</i>	+	0.1
<i>Ptilotus auriculifolius</i>	+	0.15
<i>Ptilotus obovatus</i>	+	0.8
<i>Rhagodia eremaea</i>	+	1.0
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	1.2
<i>Sporobolus australasicus</i>	+	0.4
<i>Trichodesma zeylanicum</i> ?var.	+	0.15

**API Resource Area****Site 1GPr01**

**Location:** Hardey rail and gas pipeline convergence. **Type:** Relevé

**1st Observation: Date:** 25/08/2010 **Described by:** BVNK **Seasonal Conditions:** P

**2nd Observation: Date:** 13/06/2011 **Described by:** JA/NK **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 516252 mE **Northing:** 7458997 mN

**Habitat:** Minor drainage line and outwash flow plains.

**Soil:** Red-brown clay.

**Rock Type:** Alluvially deposited small rocks and stones in patches.

**Vegetation:** *Acacia aptaneura* low open woodland over *A. kempeana* tall open shrubland over \**Cenchrus ciliaris* very open tussock grassland.

**Vegetation Code:** Mi15

**Vegetation Desc:** *Acacia aptaneura* and *A. kempeana* low open woodland to low closed forest over *T. wiseana* and / or *T. epactia* open hummock grassland to hummock grassland and \**Cenchrus ciliaris* scattered tussock grasses to open tussock grassland.

**Veg Condition:** Poor.

**Fire Age:** > 10 years.

**Notes:**

**Species List**

Name	% Cover	Height
<i>Acacia aptaneura</i>	8	5.0
<i>Acacia citrinoviridis</i>	+	6.0
<i>Acacia kempeana</i>	6	3.5
<i>Acacia synchronicia</i>	+	1.4
<i>Boerhavia coccinea</i>	+	0.2
<i>Bonamia media</i> var. <i>villosa</i>	+	0.05
<i>Cenchrus ciliaris</i>	7	0.4
<i>Citrullus colocynthis</i>	+	climber
<i>Cleome viscosa</i>	+	0.2
<i>Corchorus crozophorifolius</i>	+	0.4
<i>Corchorus tridens</i>	+	0.1
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dactyloctenium radulans</i>	+	0.1
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.15
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eremophila cuneifolia</i>	+	1.0
<i>Eremophila forrestii</i> ?subsp.	+	1.3
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>	+	0.6
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.1
<i>Gomphrena canescens</i> subsp. <i>canescens</i>	+	0.15
<i>Goodenia tenuiloba</i>	+	0.4
<i>Grevillea berryana</i>	+	6.0
<i>Hybanthus aurantiacus</i>	+	0.3
<i>Maireana planifolia</i>	+	0.2
<i>Maireana villosa</i>	+	0.3
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Polycarpaea corymbosa</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.15
<i>Portulaca oleracea</i>	+	0.05
<i>Pterocaulon sphaeranthoides</i>	+	0.1
<i>Ptilotus obovatus</i>	+	0.6

<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.15
<i>Sclerolaena costata</i>	+	0.2
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	1.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.4
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	1.2
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	2.0
<i>Sporobolus australasicus</i>	+	0.2
<i>Trianthema triquetra</i>	+	0.1
<i>Tribulus suberosus</i>	+	0.3
<i>Trichodesma zeylanicum</i> ?var.	+	0.3
<i>Triodia epactia</i>	+	0.4
<i>Triumfetta clementii</i>	+	0.1

## API Resource Area

Site

1GPr04

**Location:** Hardey Gas pipeline. South of Nanutarra-Paraburdoo Rd. **Type:** Relevé

**1st Observation:** **Date:** 26/08/2010 **Described by:** BMLK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 2/04/2011 **Described by:** JABV **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 513963 mE **Northing:** 7457222 mN

**Habitat:** Low hills facing west.

**Soil:** Skeletal red-brown clay loam.

**Rock Type:**

**Vegetation:** *Acacia xiphophylla* tall open shrubland over *Senna glutinosa* subsp. *glutinosa* x *stricta*, *S. glutinosa* subsp. x *luerssenii* and *A. tetragonophylla* shrubland over *Eremophila cuneifolia* scattered low shrubs.

**Vegetation Code:** PI11

**Vegetation Desc:** *Acacia xiphophylla* (*A. tetragonophylla* and/or *A. synchronicia*) low open woodland over *Eremophila cuneifolia* scattered shrubs.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia kempeana</i>	+	2.5
<i>Acacia synchronicia</i>	3	2.5-6
<i>Acacia tetragonophylla</i>	1.5	2.5
<i>Acacia xiphophylla</i>	3	5.0
<i>Aristida contorta</i>	+	0.15
<i>Bulbostylis barbata</i>	+	0.05
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.50
<i>Enneapogon lindleyanus</i>	+	0.15
<i>Eremophila cuneifolia</i>	1	1.00
<i>Eriachne pulchella</i> ?subsp.	+	0.10
<i>Grevillea berryana</i>	1	6.0
<i>Hibiscus gardneri</i>	+	0.05
<i>Lepidium platypetalum</i>	+	0.30
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>	+	0.20
<i>Portulaca oleracea</i>	+	0.05
<i>Ptilotus aervoides</i>	+	0.05
<i>Ptilotus obovatus</i>	+	0.80
<i>Rhagodia eremaea</i>	+	0.80
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.00
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	1.00
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	7	1.50
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	2	1.50
<i>Sida</i> sp. spiciform panicles ( <i>E. Leyland</i> s.n. 14/8/90)	+	0.80
<i>Solanum</i> sp.	+	3.00
<i>Tribulus suberosus</i>	+	0.40
<i>Triodia wiseana</i>	+	0.2

**API Resource Area****Site 1GPr08****Location:** Hardey Gas pipeline.**Type:** Relevé**1st Observation:** **Date:** 26/08/2010 **Described by:** BMLK**Seasonal Conditions:** P**2nd Observation:** **Date:** 2/04/2011 **Described by:** ABTDI**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 506360 mE**Northing:** 7456226 mN**Habitat:** Stony plain.**Soil:** Red-brown clay loam.**Rock Type:** Pebbly and cobbly ironstone.**Vegetation:** *Acacia synchronicia* tall open shrubland over *Senna artemisioides* subsp. *oligophylla* scattered shrubs over \**Cenchrus ciliaris* very open scattered tussock grassland.**Vegetation Code:** mDr32**Vegetation Desc:** *Acacia synchronicia*, *A. citrinoviridis* open shrubland over \**Cenchrus ciliaris* tussock grassland.**Veg Condition:** Poor (2010). Good (2011).**Fire Age:** > 10 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia synchronicia</i>	2.5	2.50
<i>Calandrinia</i> sp.	+	0.10
<i>Cenchrus ciliaris</i>	8	0.40
<i>Eriachne mucronata</i>	+	0.34
<i>Mollugo molluginea</i>	+	0.20
<i>Ptilotus aervoides</i>	+	0.20
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	1.00
<i>Sclerolaena costata</i>	+	0.25
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	1.00
<i>Sida fibulifera</i>	+	0.25
<i>Sporobolus australasicus</i>	+	0.30
<i>Tephrosia clementii</i>	+	0.20

**API Resource Area****Site 1GPr12****Location:** Hardey Gas pipeline.**Type:** Relevé**1st Observation:** **Date:** 27/08/2010 **Described by:** BMLK**Seasonal Conditions:** P**2nd Observation:** **Date:** 1/04/2011 **Described by:** ABTDI**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 515608 mE**Northing:** 7458386 mN**Habitat:** Flat plain.**Soil:** Red-brown clay.**Rock Type:** Gibber stones and gravels.**Vegetation:** *Acacia xiphophylla* (*A. synchronicia*) tall open shrubland over *Eremophila cuneifolia* scattered shrubs over mixed spp. (\**Cenchrus ciliaris*) scattered tussock grasses.**Vegetation Code:** PI11**Vegetation Desc:** *Acacia xiphophylla* (*A. tetragonophylla* and/or *A. synchronicia*) low open woodland over *Eremophila cuneifolia* scattered shrubs.**Veg Condition:** Very good (2010). Excellent (2011).**Fire Age:** 5 - 10 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia kempeana</i>	+	1.00
<i>Acacia synchronicia</i>	1.50	3.00
<i>Acacia tetragonophylla</i>	+	1.20
<i>Acacia wanyu</i>	+	0.8
<i>Acacia xiphophylla</i>	8	3.00
<i>Boerhavia coccinea</i>	+	0.10
<i>Cenchrus ciliaris</i>	+	0.20
<i>Eremophila cuneifolia</i>	1	1.00
<i>Eriachne pulchella</i> ?subsp.	+	0.10
<i>Maireana villosa</i>	+	0.30
<i>Portulaca oleracea</i>	+	0.10
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.40
<i>Ptilotus obovatus</i>	+	0.30
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.15
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thinly sericeous)	+	1.10
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	+	1.40
<i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26)	+	1.10
<i>Sporobolus australasicus</i>	+	0.20
<i>Trianthema triquetra</i>	+	0.10

**API Resource Area****Site** 2GPr01

**Location:** Hardey Gas pipeline. Water tanks along fenceline. **Type:** Relevé

**1st Observation: Date:** 2/04/2011 **Described by:** ABTDI **Seasonal Conditions:** E

**2nd Observation: Date:** **Described by:** **Seasonal Conditions:**

**MGA Zone:** 50 **Easting:** 511762 mE **Northing:** 7457123 mN

**Habitat:** Summit and eastern slopes of very low rocky hill.

**Soil:** Orange brown clay loam.

**Rock Type:** White crumbly sheeting.

**Vegetation:** *Acacia xiphophylla* tall open shrubland over *Senna* sp. Meekatharra and *Eremophila cuneifolia* scattered low shrubs over \**Cenchrus ciliaris* and *Enneapogon polyphyllus* very open tussock grassland with *Salsola tragus* scattered herbs.

**Vegetation Code:** PI11

**Vegetation Desc:** *Acacia xiphophylla* (*A. tetragonophylla* and/or *A. synchronicia*) low open woodland over *Eremophila cuneifolia* scattered shrubs.

**Veg Condition:** Good (heavy grazing).

**Fire Age:** 5 - 10 years.

**Notes:** One phase of survey only (2011).

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia synchronicia</i>	+	0.40
<i>Acacia tetragonophylla</i>	+	0.30
<i>Acacia xiphophylla</i>	5	2.50
<i>Boerhavia coccinea</i>	+	0.10
<i>Cenchrus ciliaris</i>	6	0.30
<i>Enneapogon caeruleus</i>	2	0.20
<i>Eragrostis pergracilis</i>	+	0.15
<i>Eremophila cuneifolia</i>	1	0.70
<i>Eriachne mucronata</i>	+	0.30
<i>Eriachne pulchella</i> ?subsp.	+	0.20
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.30
<i>Salsola tragus</i> subsp. <i>tragus</i>	1	0.30
<i>Sclerolaena costata</i>	+	0.15
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	0.70
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	1.50	0.70
<i>Solanum lasiophyllum</i>	+	0.30
<i>Sporobolus australasicus</i>	+	0.20
<i>Trianthema oxycalyptra</i> var. <i>oxycalyptra</i>	+	0.25
<i>Trianthema triquetra</i>	+	0.20



**API Resource Area****Site** 2GPr02

**Location:** Hardey Gas Pipeline. South of Nanutarra-Paraburdoo Road, north of Hardey River. **Type:** Relevé

**1st Observation:** **Date:** 2/04/2011 **Described by:** JABV **Seasonal Conditions:** E

**2nd Observation:** **Date:** **Described by:** **Seasonal Conditions:**

**MGA Zone:** 50 **Easting:** 502981 mE **Northing:** 7453836 mN

**Habitat:** Floodplain.

**Soil:** Red-brown clayey loam.

**Rock Type:** N/A

**Vegetation:** *Acacia synchronicia* tall shrubland over *Senna artemisioides* subsp. *oligophylla* open shrubland over \**Cenchrus ciliaris* (\**C. setiger*) and *Eragrostis eriopoda* tussock grassland.

**Vegetation Code:** mDr32

**Vegetation Desc:** *Acacia synchronicia*, *A. citrinoviridis* open shrubland to shrubland over \**Cenchrus ciliaris* tussock grassland.

**Veg Condition:** Poor.

**Fire Age:** >10 years.

**Notes:** Small areas of *Acacia citrinoviridis* over \**Cenchrus ciliaris* occur as a mosaic within this survey unit. One phase of survey only (2011).

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia synchronicia</i>	15	3.50
<i>Boerhavia coccinea</i>	+	0.10
<i>Cenchrus ciliaris</i>	40	0.50
<i>Cenchrus setiger</i>	5	0.40
<i>Cleome viscosa</i>	+	0.20
<i>Eragrostis eriopoda</i>	1	0.30
<i>Eriachne pulchella</i> ?subsp.	+	0.10
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.25
<i>Scaevola spinescens</i>	+	0.15
<i>Sclerolaena costata</i>	+	0.15
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	3	1.20
<i>Sporobolus australasicus</i>	+	0.15

## API Resource Area

Site 1RA01

<b>Location:</b>	Hardey Resource Area.	<b>Type:</b>	Q	50 x 50 m
<b>1st Observation:</b>	<b>Date:</b> 16/04/2009	<b>Described by:</b> JA	<b>Seasonal Conditions:</b>	E
<b>2nd Observation:</b>	<b>Date:</b> 5/04/2011	<b>Described by:</b> JATDI	<b>Seasonal Conditions:</b>	E
<b>MGA Zone:</b>	<b>Easting:</b> 530924 mE	<b>Northing:</b>	7460381 mN	
<b>Habitat:</b>	Very gently undulating narrow plain at southern base of low rocky hills.			
<b>Soil:</b>	Red-brown clayey loam with ironstone pebbles.			
<b>Rock Type:</b>	Ironstone pebbles.			
<b>Vegetation:</b>	<i>Acacia aptaneura</i> , <i>A. synchronicia</i> , <i>A. xiphophylla</i> high shrubland over <i>Senna</i> spp. and <i>A. tetragonophylla</i> shrubland over <i>Chenopod</i> spp. mixed hermland and mixed spp. very open tussock grassland with <i>Triodia wiseana</i> very open hummock grassland.			
<b>Vegetation Code:</b>	PI08			
<b>Vegetation Desc:</b>	<i>Acacia xiphophylla</i> and <i>A. aptaneura</i> low open woodland over <i>A. tetragonophylla</i> and <i>A. synchronicia</i> tall open shrubland over <i>Senna glutinosa</i> ssp. <i>glutinosa</i> x <i>stricta</i> and <i>Eremophila cuneifolia</i> open shrubland over <i>Sporobolus australasicus</i> and * <i>Cenchrus ciliaris</i> very open tussock grassland with <i>Triodia wiseana</i> very open hummock grassland.			
<b>Veg Condition:</b>	Excellent - grazed			
<b>Fire Age:</b>	> 10 yrs			
<b>Notes:</b>	<i>Acacia xiphophylla</i> and <i>A. aptaneura</i> low open woodland over <i>A. tetragonophylla</i> and <i>A. synchronicia</i> tall open shrubland over <i>Senna glutinosa</i> ssp. <i>glutinosa</i> x <i>stricta</i> and <i>Eremophila cuneifolia</i> open shrubland over <i>Sporobolus australasicus</i> and * <i>Cenchrus ciliaris</i> very open tussock grassland with <i>Triodia wiseana</i> very open hummock grassland.			

## Species List

Name	% Cover	Height
<i>Abutilon fraseri</i>	<2	0.3m
<i>Acacia aptaneura</i>	2	6
<i>Acacia synchronicia</i>	1	3.5
<i>Acacia tetragonophylla</i>	3	2.0
<i>Acacia xiphophylla</i>	1	4.0
<i>Amaranthus mitchellii</i>	<2	0.15m
<i>Amyema fitzgeraldii</i>	+	-
<i>Aristida contorta</i>	+	0.15
<i>Bidens bipinnata</i>	<2	0.1m
<i>Boerhavia coccinea</i>	+	0.1
<i>Brachyachne prostrata</i>	+	0.05
<i>Bulbostylis barbata</i>	+	0.05
<i>Cenchrus ciliaris</i>	1	0.4
<i>Cleome viscosa</i>	+	0.2
<i>Corchorus crozophorifolius</i>	+	0.4
<i>Corchorus tridens</i>	+	0.1
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	<2	1m
<i>Dactyloctenium radulans</i>	+	0.1
<i>Duperreya commixta</i>	<2	0.1m
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Eremophila cuneifolia</i>	1	1.0
<i>Eremophila forrestii</i> ?subsp.	+	0.5
<i>Eriachne mucronata</i> (typical form)	<2	0.5m
<i>Eriachne mucronata</i>	+	0.3
<i>Eriachne pulchella</i> ?subsp.	+	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	<2	0.1m

<i>Euphorbia</i> sp. (PAN5-15)	<2	0.05m
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	<2	0.05m
<i>Flaveria trinervia</i>	<2	0.1m
<i>Gomphrena canescens</i> subsp. <i>canescens</i>	<2	0.15m
<i>Gomphrena cunninghamii</i>	+	0.1
<i>Heliotropium heteranthum</i>	<2	0.05m
<i>Hibiscus burtonii</i>	<2	0.5m
<i>Hibiscus gardneri</i>	<2	
<i>Iseilema eremaeum</i>	+	0.05
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	0.8
<i>Maireana melanocoma</i>	+	0.2
<i>Maireana planifolia</i>	<2	0.2m
<i>Mollugo molluginea</i>	+	0.1
<i>Notoleptopus decaisnei</i> var. <i>Orbicularis</i>	<2	0.05m
<i>Paraneurachne muelleri</i>	<2	0.4m
<i>Paspalidium clementii</i>	<2	0.1m
<i>Phyllanthus erwinii</i>	<2	0.05
<i>Polycarpaea corymbosa</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.15
<i>Portulaca oleracea</i>	+	0.05
<i>Ptilotus aevroides</i>	+	0.05
<i>Ptilotus auriculifolius</i>	+	0.1
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.1
<i>Ptilotus obovatus</i>	+	0.4
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.4
<i>Rhagodia eremaea</i>	+	1.0
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.3
<i>Sclerolaena costata</i>	+	0.1
<i>Sclerolaena densiflora</i>	+	0.1
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	<2	1.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	1.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	2	1.2
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	1.5
<i>Senna stricta</i>	<2	1.6m
<i>Sida echinocarpa</i>	<2	0.2m
<i>Sida</i> sp. <i>spiciform</i> panicles (E. Leyland s.n. 14/8/90)	<2	0.4m
<i>Solanum lasiophyllum</i>	<2	0.1m
<i>Solanum sturtianum</i>	+	0.4
<i>Sporobolus australasicus</i>	1	0.2
<i>Stemodia grossa</i>	+	0.05
<i>Trachymene pilbarensis</i>	<2	
<i>Trachymene</i> sp.	+	0.3
<i>Tragus australianus</i>	+	0.1
<i>Trianthema triquetra</i>	<2	0.05m
<i>Tribulus suberosus</i>	+	0.15
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	+	0.2
<i>Triodia wiseana</i>	3	0.4
<i>Tripogon loliiformis</i>	+	0.15

**API Resource Area****Site 1RA02****Location:** Hardey Resource Area.**Type:** Quadrat 50 x 50 m**1st Observation: Date:** 16/04/2009 **Described by:** JA**Seasonal Conditions:****2nd Observation: Date:** 5/04/2011 **Described by:** JATDI**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 531872 mE **Northing:** 7460592 mN**Habitat:** Southwest side of low rocky rise.**Soil:** Red-brown sandy clay.**Rock Type:** Granite.**Vegetation:** *Acacia arida* (*Senna glutinosa* subsp. *x luerssenii* and *S. glutinosa* subsp. *pruinosa*) open shrubland over *Triodia wiseana* hummock grassland.**Vegetation Code:** HBr4**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.**Veg Condition:** Excellent.**Fire Age:** > 10 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon lepidum</i>	+	0.15
<i>Acacia arida</i>	5	1.4
<i>Acacia synchronicia</i>	+	
<i>Acacia tetragonophylla</i>	+	1.2
<i>Aerva javanica</i>	+	0.2
<i>Amaranthus mitchellii</i>	+	0.3
<i>Aristida contorta</i>	+	0.3
<i>Boerhavia coccinea</i>	+	0.15
<i>Bulbostylis barbata</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.2
<i>Cleome viscosa</i>	+	0.3
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.3
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.15
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila cuneifolia</i>	+	1.1
<i>Eriachne pulchella</i> ?subsp.	+	0.15
<i>Euphorbia australis</i>	+	0.05
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.15
<i>Goodenia microptera</i>	+	0.2
<i>Heliotropium heteranthum</i>	+	0.05
<i>Hibiscus coatesii</i>	+	0.1
<i>Iseilema eremaeum</i>	+	0.05
<i>Mollugo molluginea</i>	+	0.1
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.15
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.1
<i>Portulaca oleracea</i>	+	0.05
<i>Pterocaulon sphaeranthoides</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.1

<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.1
<i>Ptilotus fusiformis</i>	+	0.3
<i>Ptilotus obovatus</i>	+	0.6
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.50
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1	3.0
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	1	1.3
<i>Sida</i> sp.	+	0.1
<i>Solanum horridum</i>	+	0.15
<i>Solanum lasiophyllum</i>	+	0.3
<i>Sporobolus australasicus</i>	+	0.15
<i>Tephrosia supina</i>	+	0.1
<i>Trachymene</i> sp.	+	0.3
<i>Tribulus hirsutus</i>	+	0.2
<i>Tribulus suberosus</i>	+	0.4
<i>Trichodesma zeylanicum</i> ?var.	+	0.3
<i>Triodia wiseana</i>	50	0.4
<i>Triumfetta clementii</i>	+	0.3
<i>Triumfetta</i> sp.	+	

**API Resource Area****Site 1RA03**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 16/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 6/04/2011 **Described by:** JATDI **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531958 mE **Northing:** 7460819 mN

**Habitat:** South west sloping plain with cobble-sized rocky mantle.

**Soil:** Red loam with ironstone rocks and pebbles.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia xiphophylla* (*A. aptaneura*) low woodland over *Senna glutinosa* subsp. *glutinosa* x *stricta*, *Eremophila cuneifolia* and *A. tetragonophylla* open shrubland over *Triodia wiseana* and *T. angusta* very open hummock grassland with \**Cenchrus ciliaris* scattered tussock grasses.

**Vegetation Code:** PI08

**Vegetation Desc:** *Acacia xiphophylla* (*A. aptaneura*) low open woodland to low woodland over *Senna* spp., *Eremophila cuneifolia* scattered shrubs to open shrubland over *Triodia wiseana* scattered hummock grasses to open hummock grassland.

**Veg Condition:** Good (2009). Excellent (2011).

**Fire Age:** > 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon dioicum</i>	+	0.1
<i>Abutilon fraseri</i>	+	0.3
<i>Acacia aptaneura</i>	1	5.0
<i>Acacia synchronicia</i>	+	1.0
<i>Acacia tetragonophylla</i>	1	2.0
<i>Acacia xiphophylla</i>	10	6.0
<i>Amaranthus cuspidifolius</i>	+	0.15
<i>Boerhavia coccinea</i>	+	0.1
<i>Brachyachne prostrata</i>	+	0.05
<i>Cenchrus ciliaris</i>	1	0.6
<i>Cenchrus setiger</i>	+	0.4
<i>Corchorus tridens</i>	+	0.3
<i>Citrullus colocynthis</i>	+	climber
<i>Cleome viscosa</i>	+	0.3
<i>Corchorus sp.</i>	+	0.1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.3
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dactyloctenium radulans</i>	+	0.1
<i>Duperreya commixta</i>	+	climber
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	1.2
<i>Enneapogon caeruleus</i>	+	0.1
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Eremophila cuneifolia</i>	1	1.0
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.1
<i>Goodenia forrestii</i>	+	0.04
<i>Gomphrena cunninghamii</i>	+	0.1
<i>Gossypium australe</i>	+	0.1
<i>Grevillea berryana</i>	+	1.2
<i>Iseilema membranaceum</i>	+	0.05
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.3

<i>Maireana planifolia</i>	+	0.4
<i>Melhania oblongifolia</i>	+	0.4
<i>Mollugo molluginea</i>	+	0.2
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.15
<i>Polycarpaea corymbosa</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.15
<i>Portulaca oleracea</i>	+	0.05
<i>Pterocaulon sphaeranthoides</i>	+	0.1
<i>Ptilotus aervoides</i>	+	0.05
<i>Ptilotus auriculifolius</i>	0.2	+
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.1
<i>Ptilotus obovatus</i>	1	0.5
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.5
<i>Rhagodia eremaea</i>	+	1.8
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.1
<i>Sclerolaena densiflora</i>	+	0.1
<i>Sclerolaena eriacantha</i>	+	0.05
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	5	0.4
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	2	1.0
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	1	1.4
<i>Sida echinocarpa</i>	+	0.2
<i>Sida fibulifera</i>	+	0.15
<i>Solanum lasiophyllum</i>	<1	0.2
<i>Sporobolus australasicus</i>	1	0.2
<i>Stemodia grossa</i>	+	0.15
<i>Tragus australianus</i>	+	0.1
<i>Tribulus suberosus</i>	+	0.4
<i>Triodia angusta</i>	1	0.4
<i>Triodia wiseana</i>	2	0.4
<i>Tripogon loliiformis</i>	+	0.1

**API Resource Area****Site 1RA04**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 16/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 9/05/2011 **Described by:** BV/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 532169 mE **Northing:** 7461160 mN

**Habitat:** Floodplain on west side of creek.

**Soil:** Fine brown loamy sand.

**Rock Type:** Alluvial pebbles.

**Vegetation:** *Acacia citrinoviridis* low woodland over *Stylobasium spathulatum* and *Petalostylis labicheoides* scattered shrubs over \**Cenchrus ciliaris* (\**C. setiger*) tussock grassland.

**Vegetation Code:** Ma03

**Vegetation Desc:** (*Eucalyptus victrix* and/or *Eucalyptus leucophloia* subsp. *leucophloia*), *Acacia citrinoviridis* low open woodland over *Petalostylis labicheoides*, *Stylobasium spathulatum*, *A. bivenosa* tall shrubland over *Triodia angusta*, *T. wiseana* very open hummock grassland and \**Cenchrus ciliaris* scattered tussock grassland.

**Veg Condition:** Fair - good (2009). Fair (2011).

**Fire Age:** 5 - 10 years

**Notes:**

**Species List**

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	1.2
<i>Acacia bivenosa</i>	+	3
<i>Acacia citrinoviridis</i>	50	5.0
<i>Acacia coriacea</i> subsp. <i>pendens</i>	+	2.5
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	2
<i>Acetosa vesicaria</i>	+	0.6
<i>Aerva javanica</i>	1	0.5
<i>Aristida burbidgeae</i>	+	0.4
<i>Boerhavia coccinea</i>	+	0.05
<i>Cenchrus ciliaris</i>	60	0.7
<i>Cenchrus setiger</i>	10-15	1
<i>Cenchrus setiger</i>	2	1.0
<i>Citrullus colocynthis</i>	+	climber
<i>Cleome viscosa</i>	+	0.6
<i>Corchorus crozophorifolius</i>	+	0.8
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.2
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1.3
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Eriachne mucronata</i> (typical form)	+	0.5
<i>Euphorbia biconvexa</i>	+	0.4
<i>Glycine canescens</i>	+	climber
<i>Gomphrena cunninghamii</i>	+	0.1
<i>Gossypium australe</i> (Burrup Peninsula form)	+	0.5
<i>Hybanthus aurantiacus</i>	+	0.5
<i>Indigofera colutea</i>	+	0.2
<i>Indigofera monophylla</i>	+	0.2
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	climber
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.2



<i>Operculina aequisejala</i>	+	0.25
<i>Paspalidium clementii</i>	+	0.15
<i>Petalostylis labicheoides</i>	1	1.5
<i>Phyllanthus sp.</i>	+	0.1
<i>Pluchea dentex</i>	+	0.08
<i>Polycarpaea longiflora</i>	+	0.3
<i>Pterocaulon sphaeranthoides</i>	+	0.3
<i>Ptilotus obovatus</i>	+	0.6
<i>Rhagodia eremaea</i>	+	1.0
<i>Rhynchosia minima</i>	+	0.3
<i>Senna notabilis</i>	+	0.4
<i>Senna artemisioides subsp. oligophylla</i>	+	0.6
<i>Senna glutinosa subsp. glutinosa</i>	+	1.8
<i>Senna glutinosa subsp. x luerssenii</i>	+	2
<i>Sporobolus australasicus</i>	+	0.15
<i>Stylobasium spathulatum</i>	1	0.5
<i>Tephrosia rosea var. glabrior</i>	+	0.5
<i>Tephrosia rosea var. rosea</i>	+	0.4
<i>Trachymene oleracea subsp. oleracea</i>	+	0.3
<i>Trichodesma zeylanicum ?var.</i>	+	0.6
<i>Triodia angusta</i>	+	0.5
<i>Triodia wiseana</i>	+	0.5
<i>Waltheria indica</i>	+	0.3
<i>Zaleya galericulata subsp. galericulata</i>	+	climber

**API Resource Area****Site 1RA05****Location:** Hardey Resource Area.**Type:** Quadrat 50 x 50 m**1st Observation: Date:** 17/04/2009 **Described by:** BV**Seasonal Conditions:** E**2nd Observation: Date:** 9/05/2011 **Described by:** JADW**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 531966 mE**Northing:** 7461487 mN**Habitat:** Drainage channel bank and tributary channel draining small range of rocky crops.**Soil:** Alluvial sands, gravel and cobbles with some alluvial clay.**Rock Type:** Not recorded.**Vegetation:** *Acacia citrinoviridis* low woodland over *Petalostylis labicheoides* and *Stylobasium spathulatum* tall open shrubland over \**Cenchrus ciliaris* (\**C. setiger*) tussock grassland.**Vegetation Code:** Ma03**Vegetation Desc:** (*Eucalyptus victrix* and/or *Eucalyptus leucophloia* subsp. *leucophloia*), *Acacia citrinoviridis* low open woodland over *Petalostylis labicheoides*, *Stylobasium spathulatum*, *A. bivenosa* tall shrubland over *Triodia angusta*, *T. wiseana* very open hummock grassland and \**Cenchrus ciliaris* scattered tussock grassland.**Veg Condition:** Good (2009). Fair (2011).**Fire Age:** >10 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon fraseri</i>	+	0.2
<i>Acacia bivenosa</i>	+	1.8
<i>Acacia citrinoviridis</i>	20	5.0
<i>Acacia pruinocarpa</i>	1	3
<i>Acacia tetragonophylla</i>	+	1.0
<i>Aerva javanica</i>	+	0.5
<i>Boerhavia coccinea</i>	+	0.2
<i>Cenchrus ciliaris</i>	30	0.5
<i>Cenchrus setiger</i>	1	0.4
<i>Citrullus colocynthis</i>	+	climber
<i>Cleome viscosa</i>	+	0.05
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>	+	1.5
<i>Corchorus crozophorifolius</i>	+	0.4
<i>Corchorus tridens</i>	+	0.1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.3
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cyperus vaginatus</i>	+	0.5
<i>Duperreya commixta</i>	+	climber
<i>Eremophila longifolia</i>	+	2.0
<i>Euphorbia</i> sp. (PAN5-15)	+	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.2
<i>Glycine canescens</i>	+	climber
<i>Gossypium australe</i> (Whim Creek form)	+	0.2
<i>Gossypium robinsonii</i>	+	3.5
<i>Grevillea berryana</i>	+	4.0
<i>Hybanthus aurantiacus</i>	+	0.2
<i>Indigofera monophylla</i>	+	0.3
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.2
<i>Mollugo molluginea</i>	+	0.3
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Operculina aequisejala</i>	+	climber

<i>Peripleura arida</i>	+	climber
<i>Petalostylis labicheoides</i>	3	4.0
<i>Phyllanthus maderaspatensis</i>	+	0.4
<i>Polycarpaea longiflora</i>	+	0.2
<i>Pterocaulon sphaeranthoides</i>	+	0.3
<i>Ptilotus obovatus</i>	+	0.4
<i>Rhagodia eremaea</i>	+	0.01
<i>Rhynchosia minima</i>	+	0.15
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.5
<i>Senna notabilis</i>	+	0.2
<i>Sporobolus australasicus</i>	+	0.15
<i>Stemodia grossa</i>	+	0.3
<i>Stylobasium spathulatum</i>	3	3.5
<i>Tephrosia rosea</i> var. <i>glabrior</i>	+	0.2
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.2
<i>Triodia wiseana</i>	+	0.3
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>	+	0.2

## API Resource Area

Site 1RA06

Location: Hardey Resource Area.

Type: Quadrat 50 x 50 m

1st Observation: Date: 17/04/2009 Described by: BV

Seasonal Conditions: E

2nd Observation: Date: 24/05/2011 Described by: BM/JK

Seasonal Conditions: E

MGA Zone: 50 Easting: 531563 mE

Northing: 7461993 mN

Habitat: Hill crest with exposed rocks.

Soil: Skeletal red loam.

Rock Type: Laterite.

Vegetation: *Acacia aptaneura* low open forest over *Dodonaea petiolaris* and *Eremophila platycalyx* subsp. *platycalyx* tall shrubland over *Ptilotus obovatus* scattered low shrubs over *Polycarpha longiflora* very open hermland with *Triodia wiseana* very open hummock grassland.

Vegetation Code: Hi08

Vegetation Desc: *Acacia aptaneura* low open woodland over *Senna* spp. and *Eremophila* spp. scattered shrubs to open shrubland over *Triodia wiseana* (*T. angusta*) very open hummock grassland.

Veg Condition: Excellent.

Fire Age: 5-10 years.

Notes:

## Species List

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	
<i>Acacia aptaneura</i>	45	5.0
<i>Acacia bivenosa</i>	+	1.0
<i>Acacia pruinocarpa</i>	+	
<i>Acacia synchronicia</i>	+	0.3
<i>Acacia tetragonophylla</i>	+	3.0
<i>Aerva javanica</i>	+	0.2
<i>Amaranthus cuspidifolius</i>	+	0.3
<i>Bidens bipinnata</i>	+	0.3
<i>Boerhavia gardneri</i>	+	prostrate
<i>Cenchrus ciliaris</i>	+	0.3
<i>Cleome viscosa</i>	+	0.4
<i>Corchorus crozophorifolius</i>	+	0.1
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	
<i>Dodonaea petiolaris</i>	15	0.8
<i>Dodonaea petiolaris</i>	5	
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	
<i>Enneapogon caeruleascens</i>	+	0.1
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	
<i>Eragrostis cumingii</i>	+	0.2
<i>Eremophila cryptothrix</i>	+	2.0
<i>Eremophila cuneifolia</i>	1	
<i>Eremophila cuneifolia</i>	+	1.0
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>	5	2.0
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	+	0.2
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.2
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Gomphrena kanisii</i>	+	0.1

<i>Grevillea berryana</i>	+	4.0
<i>Hibiscus coatesii</i>	+	0.2
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.2
<i>Maireana melanocoma</i>	+	0.3
<i>Mollugo molluginea</i>	+	0.2
<i>Nicotiana benthamiana</i>	+	0.3
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.2
<i>Paspalidium clementii</i>	+	0.1
<i>Peripleura arida</i>	+	0.2
<i>Polymeria longifolia</i>	3	0.3
<i>Portulaca oleracea</i>	+	0.05
<i>Ptilotus auriculifolius</i>	+	0.3
<i>Ptilotus clementii</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus fusiformis</i>	+	0.3
<i>Ptilotus obovatus</i>	1	0.4
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.3
<i>Scaevola acacioides</i>	+	0.8
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	2.0
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	1	
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1	
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	2.0
<i>Senna stricta</i>	+	2.0
<i>Sida echinocarpa</i>	+	0.05
<i>Sporobolus australasicus</i>	+	0.3
<i>Solanum sturtianum</i>	+	
<i>Stemodia grossa</i>	+	0.2
<i>Trachymene pilbarensis</i>	+	0.2
<i>Tribulus suberosus</i>	+	1.2
<i>Trichodesma zeylanicum</i> ?var.	+	0.2
<i>Triodia wiseana</i>	6	0.3
<i>Triumfetta clementii</i>	+	0.3

## API Resource Area

Site 1RA07

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 17/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation:** **Date:** 12/05/2011 **Described by:** JA/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530268 mE **Northing:** 7462865 mN

**Habitat:** North facing slope with minor drainage depression.

**Soil:** Skeletal red loam with stony mantle.

**Rock Type:** Ironstone.

**Vegetation:** *Senna glutinosa* subsp. *pruinosa*, *S. glutinosa* subsp. *glutinosa* and *Acacia bivenosa* scattered shrubs over *Triodia wiseana* (*T. angusta*) hummock grassland.

**Vegetation Code:** Hi03

**Vegetation Desc:** *Triodia wiseana* (*T. angusta*) hummock grassland with *Senna* spp., *Stylobasium spathulatum*, *Acacia synchronicia* scattered shrubs to open shrubland.

**Veg Condition:** Excellent.

**Fire Age:** < 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia bivenosa</i>	+	1.2
<i>Acacia pruinocarpa</i>	+	0.5
<i>Acacia synchronicia</i>	+	0.8
<i>Boerhavia coccinea</i>	+	0.15
<i>Bulbostylis barbata</i>	+	0.1
<i>Cleome viscosa</i>	+	0.3
<i>Corchorus laniflorus</i>	+	0.4
<i>Cymbopogon ambiguus</i>	+	0.3
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.15
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Eremophila cuneifolia</i>	+	0.4
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Iseilema membranaceum</i>	+	0.15
<i>Mollugo molluginea</i>	+	0.1
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Polycarpaea holtzei</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.3
<i>Portulaca oleracea</i>	+	0.05
<i>Pterocaulon sphaeranthoides</i>	+	0.1
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus calostachyus</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.45
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.1
<i>Ptilotus obovatus</i>	+	0.4
<i>Scaevola acacioides</i>	+	0.04
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.8
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	0.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.0
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.5
<i>Sporobolus australasicus</i>	+	0.15
<i>Solanum gabriellae</i>	+	0.03

<i>Trachymene pilbarensis</i>	+	0.2
<i>Tribulus suberosus</i>	+	0.5
<i>Triodia angusta</i>	3	0.4
<i>Triodia wiseana</i>	50	0.4

## API Resource Area

Site 1RA08

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 17/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 24/05/2011 **Described by:** JATD **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530244 mE **Northing:** 7462711 mN

**Habitat:** Moderately steep east facing slope, near the crest of a hill.

**Soil:** Skeletal red loam.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia aptaneura* low open woodland over *Senna glutinosa* subsp. x *luerssenii*, *S. glutinosa* subsp. *glutinosa* x *stricta* and *Tribulus suberosus* open shrubland over *T. wiseana* (*T. ? angusta*) open hummock grassland over mixed spp. very open herbland.

**Vegetation Code:** Hi08

**Vegetation Desc:** *Acacia aptaneura* low open woodland over *Senna* spp. and *Eremophila* spp. scattered shrubs to open shrubland over *Triodia wiseana* (*T. angusta*) very open hummock grassland.

**Veg Condition:** Good (2009). Excellent (2011).

**Fire Age:** >10 years.

**Notes:** Phase 2 (2011): Track has been cleared through quadrat, approximately 40% of the quadrat disturbed since 2009.

## Species List

Name	% Cover	Height
<i>Acacia aptaneura</i>	35	6.0
<i>Acacia bivenosa</i>	+	1.5
<i>Acacia sibirica</i>		
<i>Acacia synchronicia</i>	+	1.5
<i>Acacia tetragonophylla</i>	+	3.0
<i>Aerva javanica</i>	+	0.5
<i>Amaranthus cuspidifolius</i>	+	0.6
<i>Amaranthus</i> sp.	+	0.05
<i>Aristida contorta</i>	+	0.2
<i>Boerhavia coccinea</i>	+	0.15
<i>Bulbostylis barbata</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.3
<i>Cleome viscosa</i>	+	0.4
<i>Convolvulus clementii</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	0.15
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.5
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.6
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila cryptothrix</i>	+	1.1
<i>Eremophila cuneifolia</i>	+	1.2
<i>Eremophila longifolia</i>	+	1.5
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.15
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.2
<i>Euphorbia</i> sp.	+	0.05
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.3
<i>Hibiscus coatesii</i>	+	0.4



<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	climber
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.1
<i>Maireana georgei</i>	+	0.4
<i>Mollugo molluginea</i>	+	0.15
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.15
<i>Polycarpaea holtzei</i>	+	0.05
<i>Polycarpaea longiflora</i>	+	0.3
<i>Portulaca oleracea</i>	+	0.05
<i>Pterocaulon sphaeranthoides</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus calostachyus</i>	+	0.3
<i>Ptilotus clementii</i>	+	0.4
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus fusiformis</i>	3	0.5
<i>Ptilotus obovatus</i>	+	0.6
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.5
<i>Rhagodia eremaea</i>	+	1.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	1	1
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	2	1.8
<i>Solanum gabrielae</i>	+	0.15
<i>Solanum horridum</i>	+	0.3
<i>Sporobolus australasicus</i>	+	0.2
<i>Stemodia grossa</i>	+	0.3
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.5
<i>Trachymene pilbarensis</i>	+	0.5
<i>Tribulus suberosus</i>	1	
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia</i> ? <i>angusta</i>	3	0.5
<i>Triodia wiseana</i>	1	0.4

**API Resource Area****Site 1RA09****Location:** Hardey Resource Area.**Type:** Quadrat 50 x 50 m**1st Observation: Date:** 17/04/2009 **Described by:** JA**Seasonal Conditions:** E**2nd Observation: Date:** 8/05/2011 **Described by:** JADW**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 530435 mE**Northing:** 7461567 mN**Habitat:** Narrow creek.**Soil:** Deep loamy coarse river sand.**Rock Type:** River stones.**Vegetation:** *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Acacia citrinoviridis* (*A. tetragonophylla*, *Stylobasium spathulatum* and *A. bivenosa*) tall open scrub over *Triodia angusta* very open hummock grassland with *\*Cenchrus ciliaris* scattered tussock grasses.**Vegetation Code:** Ma03**Vegetation Desc:** (*Eucalyptus victrix* and/ or *Eucalyptus leucophloia* subsp. *leucophloia*), *Acacia citrinoviridis* low open woodland over *Petalostylis labicheoides*, *Stylobasium spathulatum*, *A. bivenosa* tall shrubland over *Triodia angusta*, *T. wiseana* very open hummock grassland and *\*Cenchrus ciliaris* scattered tussock grasses.**Veg Condition:** Excellent.**Fire Age:** > 10 years.**Notes:****Species List**

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	1
<i>Acacia bivenosa</i>	1	3.0
<i>Acacia citrinoviridis</i>	40	6.0
<i>Acacia synchronicia</i>	+	2.0
<i>Acacia tetragonophylla</i>	1	4.0
<i>Aerva javanica</i>	+	0.5
<i>Amaranthus cuspidifolius</i>	+	0.4
<i>Bidens bipinnata</i>	+	0.5
<i>Boerhavia coccinea</i>	+	0.2
<i>Brachyachne prostrata</i>	+	0.05
<i>Bulbostylis barbata</i>	+	0.15
<i>Cenchrus ciliaris</i>	1	0.6
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	+	0.1
<i>Cleome viscosa</i>	+	0.5
<i>Convolvulus clementii</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	0.4
<i>Corchorus tridens</i>	+	0.15
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.2
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	2	1.2
<i>Dodonaea viscosa</i>	+	0.2
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	1
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Eremophila longifolia</i>	2-5	2
<i>Eremophila longifolia</i>	+	2.0
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	2	10.0
<i>Euphorbia biconvexa</i>	+	0.4
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.3
<i>Flaveria trinervia</i>	+	0.4

<i>Gossypium australe</i> (Whim Creek form)	+	0.6
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Gossypium robinsonii</i>	+	1.2
<i>Hibiscus coatesii</i>	+	0.2
<i>Hibiscus sturtii</i> var. <i>platyklamys</i>	+	0.3
<i>Indigofera monophylla</i>	+	0.6
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	2.0
<i>Jasminum didymum</i> subsp. <i>lineare</i>	5	1.5
<i>Lepidium pedicellosum</i>	+	0.2
<i>Maireana melanocoma</i>	+	0.3
<i>Mollugo molluginea</i>	+	0.15
<i>Nicotiana occidentalis</i> subsp. <i>occidentalis</i>	+	0.4
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.1
<i>Peripleura arida</i>	+	0.2
<i>Petalostylis labicheoides</i>	+	3
<i>Phyllanthus erwinii</i>	+	0.1
<i>Phyllanthus maderaspatensis</i>	+	0.5
<i>Polycarpaea corymbosa</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.2
<i>Pterocaulon sphaeranthoides</i>	+	0.15
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus obovatus</i>	+	0.5
<i>Rhagodia eremaea</i>	+	1.5
<i>Rhynchosia minima</i>	+	0.4
<i>Scaevola acacioides</i>	+	0.5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thinly sericeous)	+	1.3
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	1.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	2.0
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	+	1.2
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	1.8
<i>Senna notabilis</i>	+	0.1
<i>Solanum ferocissimum</i>	+	0.5
<i>Sporobolus australasicus</i>	+	0.15
<i>Stemodia grossa</i>	+	0.2
<i>Stylobasium spathulatum</i>	2	3.0
<i>Swainsona maccullochiana</i>	+	0.15
<i>Themeda triandra</i>	+	0.8
<i>Trachymene pilbarensis</i>	+	0.2
<i>Tribulus suberosus</i>	+	0.5
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia angusta</i>	5	0.7
<i>Triodia wiseana</i>	+	0.5
<i>Triumfetta clementii</i>	+	0.5

## API Resource Area

Site 1RA11

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 17/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 24/05/2011 **Described by:** BM/JK **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529837 mE **Northing:** 7461568 mN

**Habitat:** South face of rocky hill.

**Soil:** Dark red-brown sandy clay. Very shallow, very rocky.

**Rock Type:** Ironstone.

**Vegetation:** *Dodonaea pachyneura* tall open shrubland over *Acacia marramamba* scattered shrubs over *Triodia wiseana* open hummock grassland with *Eriachne mucronata* very open tussock grassland.

**Vegetation Code:** Hi22

**Vegetation Desc:** *Eucalyptus leucophloia* subsp. *leucophloia* and/ or *Corymbia ferritcola* scattered low trees over *Dodonaea pachyneura*, *Eremophila latrobei* subsp. *latrobei* scattered shrubs to open shrubland over *Triodia wiseana* scattered hummocks to open hummock grassland and *Eriachne mucronata* scattered tussock grasses.

**Veg Condition:** Excellent.

**Fire Age:** 5 - 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia aptaneura</i>	+	2.1
<i>Acacia inaequilatera</i>	+	
<i>Acacia maitlandii</i>	+	2.0
<i>Acacia marramamba</i>	1	1.0
<i>Acacia pruinocarpa</i>	+	4
<i>Acacia spondylophylla</i>	+	1.2
<i>Acacia tetragonophylla</i>	+	2.5
<i>Amaranthus interruptus</i>	+	0.3
<i>Astrotricha hamptonii</i>	+	1.5
<i>Bulbostylis barbata</i>	+	0.1
<i>Capparis spinosa</i> var. <i>nummularia</i>	+	0.5
<i>Cenchrus ciliaris</i>	+	0.4
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	+	0.1
<i>Cleome viscosa</i>	+	0.2
<i>Corchorus crozophorifolius</i>	+	0.2
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1.2
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	+	0.2
<i>Dodonaea pachyneura</i>	2.5	2.0
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.3
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	0.8
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	5	0.4
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.3
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	+	2.0
<i>Gomphrena cunninghamii</i>	+	0.3
<i>Gomphrena kanisii</i>	+	0.2
<i>Iseilema eremaeum</i>	+	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	climber
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.35

<i>Nicotiana benthamiana</i>	+	0.5
<i>Oldenlandia crouchiana</i>	+	0.2
<i>Paspalidium clementii</i>	+	0.25
<i>Polycarpaea longiflora</i>	+	0.3
<i>Pterocaulon sphaeranthoides</i>	+	0.4
<i>Ptilotus auriculifolius</i>	+	0.35
<i>Ptilotus calostachyus</i>	+	0.4
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus fusiformis</i>	+	0.4
<i>Ptilotus obovatus</i>	+	1
<i>Rhagodia eremaea</i>	+	2.0
<i>Rhodanthe margarethae</i>	+	0.4
<i>Scaevola acacioides</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.3
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	0.5
<i>Solanum lasiophyllum</i>	+	0.5
<i>Stylobasium spathulatum</i>	+	0.5
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.5
<i>Trachymene pilbarensis</i>	+	0.5
<i>Tribulus suberosus</i>	+	1.1
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	20	0.4

**API Resource Area****Site 1RA12**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 18/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation:** **Date:** 8/05/2011 **Described by:** JADW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529587 mE **Northing:** 7461923 mN

**Habitat:** North facing slope with small outcrops and rock pavement.

**Soil:** Red loam (skeletal) with stony mantle.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia maitlandii*, *A. pruinocarpa* and *A. marramamba* tall open shrubland over *A. spondylophylla* low shrubland over *Triodia wiseana* hummock grassland.

**Vegetation Code:** Hi19

**Vegetation Desc:** *Eucalyptus leucophloia* subsp. *leucophloia* and *Acacia pruinocarpa* scattered low trees to low open woodland over *A. marramamba* and *A. spondylophylla* scattered shrubs to open heath over *Triodia wiseana* hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** >10 years.

**Notes:** 2<sup>nd</sup> Observation (2011): Drill pad abuts southern edge of quadrat, cleared since 2009.

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia maitlandii</i>	5	3.0
<i>Acacia marramamba</i>	1	3.0
<i>Acacia pruinocarpa</i>	1	4.0
<i>Acacia spondylophylla</i>	12	1.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.4
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.2
<i>Indigofera monophylla</i>	+	0.3
<i>Mollugo molluginea</i>	+	0.4
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.2
<i>Polycarpaea longiflora</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.15
<i>Ptilotus fusiformis</i>	+	0.3
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.4
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.2
<i>Solanum gabrielae</i>	+	0.6
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.4
<i>Tribulus suberosus</i>	+	1.2
<i>Trichodesma zeylanicum</i> ?var.	+	0.2
<i>Triodia wiseana</i>	40	0.5
<i>Triumfetta clementii</i>	+	0.2

**API Resource Area****Site 1RA13**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 18/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 8/05/2011 **Described by:** BV/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529393 mE **Northing:** 7461510 mN

**Habitat:** South-east sloping with stony pavements and small crags.

**Soil:** Skeletal loam with stony mantle.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia maitlandii* (*A. kempeana*) scattered shrubs over *A. spondylophylla* open shrubland over *Triodia wiseana* open hummock grassland.

**Vegetation Code:** Hi19

**Vegetation Desc:** *Eucalyptus leucophloia* subsp. *leucophloia* and *Acacia pruinocarpa* scattered low trees to low open woodland over *A. marramamba* and *A. spondylophylla* scattered shrubs to open heath over *Triodia wiseana* hummock grassland.

**Veg Condition:** Good (2009). Excellent (2011).

**Fire Age:** 5 - 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia aptaneura</i>	+	1.6
<i>Acacia inaequilatera</i>	5	1
<i>Acacia kempeana</i>	10	1.3
<i>Acacia kempeana</i>	2	1.5
<i>Acacia maitlandii</i>	2	1.5
<i>Acacia marramamba</i>	+	2.0
<i>Acacia pruinocarpa</i>	+	2.0
<i>Acacia spondylophylla</i>	10	0.5
<i>Codonocarpus cotinifolius</i>	+	3
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.1
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	+	0.1
<i>Polygala isingii</i>	+	0.06
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	1.0
<i>Ptilotus fusiformis</i>	+	0.6
<i>Ptilotus obovatus</i>	+	0.5
<i>Scaevola acacioides</i>	+	1.0
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	1.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.8
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	1.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	0.5
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.0
<i>Solanum gabrielae</i>	+	1.0
<i>Solanum horridum</i>	+	0.03
<i>Solanum lasiophyllum</i>	1	1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.75
<i>Tribulus suberosus</i>	+	0.5
<i>Trichodesma zeylanicum</i> ?var.	+	0.8
<i>Triodia wiseana</i>	30	0.6
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>	+	<0.05

**API Resource Area****Site 1RA14**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 18/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 8/05/2011 **Described by:** BV/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530188 mE **Northing:** 7461388 mN

**Habitat:** Gentle north-east facing slopes at base of hill with rock crags.

**Soil:** Skeletal soils, some loam. Mainly rocks from in-situ weathering.

**Rock Type:** Ironstone with some outcrops of metamorphosed mud stone.

**Vegetation:** *Acacia xiphophylla* low open woodland over *A. synchronicia* scattered shrubs over *Triodia angusta* hummock grassland.

**Vegetation Code:** Hi03

**Vegetation Desc:** *Triodia wiseana* (*T. angusta*) hummock grassland with *Senna* spp., *Stylobasium spathulatum*, *Acacia synchronicia* scattered shrubs to open shrubland.

**Veg Condition:** Excellent (2009). Good (2011).

**Fire Age:** > 10 years.

**Notes:**

**Species List**

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	0.5
<i>Acacia kempeana</i>	+	2.0
<i>Acacia synchronicia</i>	1	2.0
<i>Acacia xiphophylla</i>	5	4.0
<i>Amaranthus cuspidifolius</i>	+	0.2
<i>Bulbostylis barbata</i>	+	0.15
<i>Cleome viscosa</i>	+	0.5
<i>Cucumis maderaspatanus</i>	+	climber
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.4
<i>Eremophila cuneifolia</i>	+	0.5
<i>Eremophila longifolia</i>	+	2.0
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.2
<i>Euphorbia australis</i>	+	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	1.2
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Goodenia microptera</i>	+	0.5
<i>Gossypium australe</i> ( <i>Whim Creek form</i> )	+	0.35
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.2
<i>Maireana georgei</i>	1	0.04
<i>Maireana georgei</i>	+	0.15
<i>Mollugo molluginea</i>	+	0.25
<i>Nicotiana benthamiana</i>	+	0.4
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.35
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	+	0.4
<i>Pluchea rubelliflora</i>	+	0.45
<i>Polycarpaea longiflora</i>	+	0.3
<i>Portulaca oleracea</i>	+	0.1
<i>Pterocaulon sphaeranthoides</i>	+	0.4
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus calostachyus</i>	+	0.6
<i>Ptilotus obovatus</i>	+	1.3



<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.4
<i>Scaevola acacioides</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.0
<i>Senna notabilis</i>	+	0.2
<i>Sida echinocarpa</i>	+	0.15
<i>Sporobolus australasicus</i>	+	0.2
<i>Stemodia grossa</i>	+	1
<i>Trachymene</i> sp.	+	0.75
<i>Tribulus suberosus</i>	+	1.0
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	+	0.5
<i>Triodia angusta</i>	60	0.6
<i>Triodia wiseana</i>	+	0.3

## API Resource Area

Site 1RA14b

Location: Hardey Resource Area.

Type: Quadrat 50 x 50 m

1st Observation: Date: 18/04/2009 Described by: JA

Seasonal Conditions: E

2nd Observation: Date: 10/05/2011 Described by: BV/DW

Seasonal Conditions: E

MGA Zone: 50 Easting: 530789 mE

Northing: 7461867 mN

Habitat: Banks and flow line of creek.

Soil: Deep coarse dark brown river sand with some river stones.

Rock Type: River stones.

Vegetation: *Acacia citrinoviridis* tall open scrub over *Eremophila cryptothrix*, *Senna glutinosa* subsp. *glutinosa* and *Stylobasium spathulatum* scrubland over mixed spp. open tussock grassland and *Triodia wiseana*, *Triodia angusta* hummock grassland.

Vegetation Code: Ma03

Vegetation Desc: (*Eucalyptus victrix* and/ or *Eucalyptus leucophloia* subsp. *leucophloia*), *Acacia citrinoviridis* low open woodland over *Petalostylis labicheoides*, *Stylobasium spathulatum*, *A. bivenosa* tall shrubland over *Triodia angusta*, *T. wiseana* very open hummock grassland and \**Cenchrus ciliaris* scattered tussock grasses.

Veg Condition: Excellent.

Fire Age: &gt; 7 years.

Notes:

## Species List

Name	% Cover	Height
<i>Acacia bivenosa</i>		1.0
<i>Acacia citrinoviridis</i>	30-40	4.5
<i>Aerva javanica</i>		1.2
<i>Amaranthus cuspidifolius</i>		0.2
<i>Amaranthus undulatus</i>		0.25
<i>Boerhavia coccinea</i>		0.05
<i>Bulbostylis barbata</i>		0.1
<i>Cenchrus ciliaris</i>	1	0.6
<i>Cleome viscosa</i>	+	0.2
<i>Corchorus crozophorifolius</i>		0.5
<i>Corymbia ferritcola</i>	+	4
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>		0.3
<i>Cucumis maderaspatanus</i>		climber
<i>Cymbopogon ambiguus</i>	+	1.1
<i>Cymbopogon obtectus</i>		0.6
<i>Datura leichhardtii</i>		0.2
<i>Dodonaea pachyneura</i>	+	1
<i>Duperreya commixta</i>	+	climber
<i>Duperreya commixta</i>		climber
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>		0.6
<i>Enneapogon lindleyanus</i>	+	0.4
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Enneapogon polyphyllus</i>		0.3
<i>Eremophila cryptothrix</i>	1	1
<i>Eremophila cuneifolia</i>	+	0.4
<i>Eriachne mucronata</i> (arid form) (MET 12 736)		0.4
<i>Eriachne mucronata</i> (typical form)		0.4
<i>Eriachne tenuiculmis</i>	+	0.5
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	+	1.7
<i>Euphorbia biconvexa</i>		0.4
<i>Flaveria trinervia</i>		0.35

<i>Gomphrena cunninghamii</i>		0.25
<i>Gossypium australe</i> (Burrup Peninsula form)		1.0
<i>Gossypium australe</i> (Whim Creek form)	+	0.3
<i>Gossypium robinsonii</i>		0.5
<i>Grevillea berryana</i>	+	1
<i>Indigofera monophylla</i>	+	0.4
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1
<i>Lepidium pedicellosum</i>	+	0.3
<i>Maireana georgei</i>		0.5
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.15
<i>Oldenlandia crouchiana</i>		0.1
<i>Paspalidium clementii</i>		0.25
<i>Petalostylis labicheoides</i>		1.25
<i>Phyllanthus maderaspatensis</i>	+	0.5
<i>Polycarpaea longiflora</i>	+	0.1
<i>Pterocaulon sphaeranthoides</i>		0.3
<i>Ptilotus auriculifolius</i>		0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus obovatus</i>	1	0.2
<i>Rhynchosia minima</i>	+	0.2
<i>Scaevola acacioides</i>	+	0.5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	1.5
<i>Senna notabilis</i>		0.2
<i>Solanum lasiophyllum</i>	+	0.15
<i>Stylobasium spathulatum</i>	2	1.5
<i>Tephrosia rosea</i> var. <i>glabrior</i>		0.1
<i>Themeda triandra</i>	2	
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>		0.7
<i>Tribulus suberosus</i>	+	1.2
<i>Trichodesma zeylanicum</i> ?var.		0.5
<i>Triodia angusta</i>		0.6
<i>Triodia epactia</i>	2	0.4
<i>Triodia wiseana</i>	15	0.4
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>	+	0.3
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>		0.6

**API Resource Area****Site 1RA15**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 18/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 10/05/2011 **Described by:** BV/DW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530323 mE **Northing:** 7462027 mN

**Habitat:** Western side of rocky hill.

**Soil:** Dark brown sandy clay.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia synchronicia* scattered shrubs over *Triodia wiseana* hummock grassland.

**Vegetation Code:** Hi03

**Vegetation Desc:** *Triodia wiseana* (*T. angusta*) hummock grassland with *Senna* spp., *Stylobasium spathulatum*, *Acacia synchronicia* scattered shrubs to open shrubland.

**Veg Condition:** Excellent (2009). Fair (2011).

**Fire Age:** 5 - 10 years.

**Notes:** Phase 2 (2011): Drilling disturbance has occurred since 2009, relevé surveyed instead.

**Species List**

Name	% Cover	Height
<i>Acacia marramamba</i>	+	1.0
<i>Acacia pruinocarpa</i>	+	1.0
<i>Acacia synchronicia</i>	1.0	1.5
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1
<i>Cymbopogon obtectus</i>	+	0.5
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.5
<i>Eremophila cryptothrix</i>	+	0.6
<i>Eremophila cuneifolia</i>	+	0.8
<i>Eremophila latrobei</i> ?subsp.	2	0.7
<i>Eremophila longifolia</i>	+	1.0
<i>Eriachne mucronata</i>	+	0.3
<i>Gomphrena cunninghamii</i>	+	0.3
<i>Maireana georgei</i>	+	0.3
<i>Nicotiana benthamiana</i>	+	0.4
<i>Oldenlandia crouchiana</i>	+	0.25
<i>Paspalidium clementii</i>	+	0.4
<i>Polycarpaea longiflora</i>	+	0.3
<i>Ptilotus calostachyus</i>	+	0.5
<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>	+	0.4
<i>Ptilotus obovatus</i>	+	0.5
<i>Scaevola acacioides</i>	+	0.6
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	0.4
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.5
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	0.6
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	1
<i>Solanum gabrielae</i>	+	0.6
<i>Solanum lasiophyllum</i>	+	1
<i>Solanum</i> sp.	+	0.08
<i>Stylobasium spathulatum</i>	+	1.6
<i>Tribulus suberosus</i>	+	1
<i>Triodia angusta</i>	60	0.6
<i>Triodia wiseana</i>	80-90	0.4

**API Resource Area****Site 1RA16**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 18/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 24/05/2011 **Described by:** JATD **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530004 mE **Northing:** 7462808 mN

**Habitat:** North facing slope of inselberg.

**Soil:** Skeletal soil of loam with rocky mantle.

**Rock Type:** Ironstone.

**Vegetation:** *Stylobasium spathulatum* scattered shrubs over *Triodia angusta* hummock grassland.

**Vegetation Code:** Hi03

**Vegetation Desc:** *Triodia wiseana* (*T. angusta*) hummock grassland with *Senna* spp., *Stylobasium spathulatum*, *Acacia synchronicia* scattered shrubs to open shrubland.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:** Phase 2 (2011): Track has been cleared through southern section of quadrat, approximately 25% of the quadrat disturbed since 2009.

**Species List**

Name	% Cover	Height
<i>Acacia citrinoviridis</i>	+	1.0
<i>Bulbostylis barbata</i>	+	0.2
<i>Cheilanthes brownii</i>	+	0.05
<i>Cleome viscosa</i>	+	0.15
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Eremophila cuneifolia</i>	+	0.5
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	0.7
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.4
<i>Lepidium pedicellosum</i>	+	0.5
<i>Nicotiana occidentalis</i> ?subsp.	+	0.1
<i>Oldenlandia crouchiana</i>	+	0.05
<i>Paspalidium clementii</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.2
<i>Ptilotus obovatus</i>	+	0.3
<i>Scaevola acacioides</i>	+	0.8
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.0
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1
<i>Solanum gabrielae</i>	+	0.2
<i>Solanum lasiophyllum</i>	+	0.5
<i>Sporobolus australasicus</i>	+	0.1
<i>Stylobasium spathulatum</i>	+	1.8
<i>Tribulus suberosus</i>	+	0.4
<i>Triodia angusta</i>	90	0.4

**API Resource Area****Site 1RA17****Location:** Hardey Resource Area.**Type:** Quadrat 50 x 50 m**1st Observation: Date:** 18/04/2009 **Described by:** BV**Seasonal Conditions:** E**2nd Observation: Date:** 24/05/2011 **Described by:** BM/JK**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 531177 mE**Northing:** 7462228 mN**Habitat:** Southeast facing rocky slope with outcrops.**Soil:** Skeletal red loam.**Rock Type:** Banded iron stone and granite.**Vegetation:** *Acacia aptaneura* low woodland over *Eremophila platycalyx* subsp. *pardalota* and *Eremophila cryptothrix* tall open shrubland over *Polycarpaea longiflora* and *Gomphrena cunninghamii* very open hermland with *Triodia angusta* scattered hummock grassland.**Vegetation Code:** Hi08**Vegetation Desc:** *Acacia aptaneura* low open woodland to low woodland over *Senna* spp. and *Eremophila* spp. scattered shrubs to open shrubland over *Triodia wiseana* (*T.angusta*) very open hummock grassland.**Fire Age:** 2 - 10 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon dioicum</i>	+	0.2
<i>Acacia aptaneura</i>	15	6.0
<i>Acacia synchronicia</i>	+	0.3
<i>Acacia tetragonophylla</i>	+	2.2
<i>Acacia xiphophylla</i>	+	4.0
<i>Aerva javanica</i>	+	0.4
<i>Amaranthus cuspidifolius</i>	+	0.4
<i>Amyema fitzgeraldii</i>	+	
<i>Aristida contorta</i>	+	0.3
<i>Bidens bipinnata</i>	+	0.3
<i>Boerhavia coccinea</i>	+	decumb
<i>Bulbostylis barbata</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.2
<i>Cleome viscosa</i>	+	0.3
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>	+	0.2
<i>Corchorus crozophorifolius</i>	+	0.4
<i>Corchorus laniflorus</i>	+	0.2
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.4
<i>Dodonaea pachyneura</i>	+	1.2
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.3
<i>Enneapogon caeruleascens</i>	+	0.1
<i>Enneapogon lindleyanus</i>	+	0.4
<i>Enneapogon polyphyllus</i>	+	0.25
<i>Eremophila cryptothrix</i>	2	2.2
<i>Eremophila cuneifolia</i>	+	0.5
<i>Eremophila longifolia</i>	+	0.8
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>	1	0.4
<i>Eriachne mucronata</i>	+	0.35
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.05
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	+	0.2

<i>Euphorbia schultzii</i>	+	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.1
<i>Flaveria trinervia</i>	+	0.3
<i>Gomphrena cunninghamii</i>	+	0.05
<i>Gossypium australe</i> (Burrup Peninsula form)	+	0.5
<i>Hibiscus coatesii</i>	+	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.0
<i>Maireana</i> ? <i>triptera</i>	+	0.3
<i>Mollugo molluginea</i>	+	0.2
<i>Nicotiana benthamiana</i>	+	0.3
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.1
<i>Polycarpaea corymbosa</i>	+	0.2
<i>Polycarpaea longiflora</i>	5	0.3
<i>Portulaca oleracea</i>	+	0.05
<i>Pterocaulon sphaeranthoides</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.3
<i>Ptilotus calostachyus</i>	+	0.3
<i>Ptilotus clementii</i>	+	0.3
<i>Ptilotus obovatus</i>	+	0.5
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.4
<i>Rhagodia eremaea</i>	+	1.0
<i>Scaevola acacioides</i>	+	1.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.0
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.0
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.5
<i>Sida echinocarpa</i>	+	0.2
<i>Sporobolus australasicus</i>	+	0.2
<i>Stemodia grossa</i>	+	0.4
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.3
<i>Tribulus suberosus</i>	+	0.6
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia angusta</i>	1.5	0.3
<i>Triodia wiseana</i>	+	0.4
<i>Triumfetta clementii</i>	+	0.4
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>	+	prostrate

**API Resource Area****Site 1RA18**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 20/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation:** **Date:** 12/05/2011 **Described by:** BV/DW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530671 mE **Northing:** 7462741 mN

**Habitat:** Hillock and slope.

**Soil:** Red loam (skeletal) with mantle composed of rocks and stones.

**Rock Type:** Ironstone.

**Vegetation:** *Senna glutinosa* subsp. *glutinosa* and *S. artemisioides* subsp. *oligophylla* open shrubland over *Triodia wiseana* closed hummock grassland.

**Vegetation Code:** Hi03

**Vegetation Desc:** *Triodia wiseana* (*T. angusta*) hummock grassland with *Senna* spp., *Stylobasium spathulatum*, *Acacia synchronicia* scattered shrubs to open shrubland.

**Veg Condition:** Good.

**Fire Age:** 5 - 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia arida</i>	+	0.6
<i>Acacia kempeana</i>	+	0.6
<i>Acacia pruinocarpa</i>	+	1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1	3
<i>Acacia tetragonophylla</i>	+	0.8
<i>Eremophila cuneifolia</i>	+	0.5
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.8
<i>Ptilotus obovatus</i>	+	0.4
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.6
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	1.0
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.5
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	0.6
<i>Solanum lasiophyllum</i>	+	0.4
<i>Tribulus suberosus</i>	+	0.8
<i>Triodia wiseana</i>	80	0.5



## API Resource Area

Site 1RA19

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 19/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation:** **Date:** 12/05/2011 **Described by:** JA/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530395 mE **Northing:** 7461179 mN

**Habitat:** South facing cliffs and breakaways.

**Soil:** Some red loam at top of cliffs, but mostly skeletal soils.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia pruinocarpa* and *A. aptaneura* low woodland over *Dodonaea petiolaris* and *Eremophila latrobei* subsp. *latrobei* open shrubland over *Triodia wiseana* very open hummock grassland with *Paspalidium clementii* (*Eriachne mucronata* (arid form) (MET 12 736)) scattered tussock grasses.

**Vegetation Code:** Hi22

**Vegetation Desc:** *Eucalyptus leucophloia* subsp. *leucophloia* and/ or *Corymbia ferritcola* scattered low trees over *Dodonaea pachyneura*, *Eremophila latrobei* subsp. *latrobei* scattered shrubs to open shrubland over *Triodia wiseana* scattered hummocks to open hummock grassland and *Eriachne mucronata* scattered tussock grasses.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	0.4
<i>Acacia aptaneura</i>	4	6.0
<i>Acacia bivenosa</i>	+	2.5
<i>Acacia citrinoviridis</i>	+	4.0
<i>Acacia pruinocarpa</i>	10	4.0
<i>Acacia tetragonophylla</i>	+	1
<i>Acacia xiphophylla</i>	+	3
<i>Amaranthus cuspidifolius</i>	+	0.4
<i>Astrotricha hamptonii</i>	+	2
<i>Bidens bipinnata</i>	+	0.3
<i>Boerhavia coccinea</i>	+	0.2
<i>Bulbostylis barbata</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.4
<i>Cheilanthes lasiophylla</i>	+	0.01
<i>Cleome viscosa</i>	+	0.4
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	+	0.4
<i>Corymbia ferritcola</i>	+	2.5
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.8
<i>Cynanchum floribundum</i>	+	climber
<i>Dodonaea pachyneura</i>	+	
<i>Dodonaea petiolaris</i>	3	1.1
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.15
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.5
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila cryptothrix</i>	+	1.8
<i>Eremophila cuneifolia</i>	+	1.5
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	1.5
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.2

<i>Eriachne mucronata</i> (typical form)	+	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.2
<i>Eucalyptus xerothermica</i>	1	2.5
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.2
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Gomphrena kanisii</i>	+	0.2
<i>Hibiscus coatesii</i>	+	0.1
<i>Hibiscus burtonii</i>	+	0.3
<i>Hibiscus haynaldii</i>	+	0.4
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1
<i>Keraudrenia nephrosperma</i>	+	0.5
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.3
<i>Maireana villosa</i>	+	0.3
<i>Mollugo molluginea</i>	+	0.1
<i>Nicotiana benthamiana</i>	+	0.2
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	1	0.1
<i>Polycarpaea longiflora</i>	+	0.3
<i>Portulaca oleracea</i>	+	0.05
<i>Pterocaulon sphaeranthoides</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.2
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus fusiformis</i>	+	0.4
<i>Ptilotus obovatus</i>	+	0.5
<i>Rhagodia eremaea</i>	+	1
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	0.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	2.1
<i>Sida echinocarpa</i>	+	0.15
<i>Solanum gabrielae</i>	+	1
<i>Sporobolus australasicus</i>	+	0.2
<i>Stemodia grossa</i>	+	0.15
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.4
<i>Trachymene pilbarensis</i>	+	0.5
<i>Tribulus suberosus</i>	1	0.7
<i>Tribulus suberosus</i>	+	1.5
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	5	0.4
<i>Triumfetta clementii</i>	+	0.4

## API Resource Area

Site 1RA20

<b>Location:</b>	Hardey Resource Area.	<b>Type:</b>	Quadrat 50 x 50 m
<b>1st Observation:</b>	<b>Date:</b> 19/04/2009	<b>Described by:</b> BV	<b>Seasonal Conditions:</b> E
<b>2nd Observation:</b>	<b>Date:</b> 12/05/2011	<b>Described by:</b> JA/MS	<b>Seasonal Conditions:</b> E
<b>MGA Zone:</b>	50	<b>Easting:</b> 530745 mE	<b>Northing:</b> 7461259 mN
<b>Habitat:</b>	North-east facing slope with minor drainage channel on west side.		
<b>Soil:</b>	Red loam with rock debris mantle.		
<b>Rock Type:</b>	Ironstone.		
<b>Vegetation:</b>	<i>Acacia pruinocarpa</i> and <i>A. aptaneura</i> low open woodland over <i>Eremophila latrobei</i> subsp. <i>latrobei</i> scattered shrubs over <i>Triodia wiseana</i> hummock grassland.		
<b>Vegetation Code:</b>	Hi09		
<b>Vegetation Desc:</b>	<i>Acacia aptaneura</i> , <i>A. pruinocarpa</i> low open woodland to low woodland over <i>Eremophila cryptothrix</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> scattered shrubs to open shrubland over <i>Triodia wiseana</i> scattered hummock grasses to open hummock grassland.		
<b>Veg Condition:</b>	Good (2009). Excellent (2011).		
<b>Fire Age:</b>	> 10 years.		
<b>Notes:</b>	Phase 1 (2009): Some disturbance on south-west side of quadrat. Phase 2 (2011): Track and drill pad cleared through quadrat, approximately 75% of quadrat has been disturbed since 2009. Relevé surveyed through undisturbed vegetation in and around quadrat.		

## Species List

Name	% Cover	Height
<i>Acacia aptaneura</i>	2	6.0
<i>Acacia citrinoviridis</i>	+	1.3
<i>Acacia inaequilatera</i>	+	1.5
<i>Acacia kempeana</i>	+	0.3
<i>Acacia marramamba</i>	+	1.0
<i>Acacia pruinocarpa</i>	3	5.0
<i>Acacia rhodophloia</i>	+	2
<i>Amyema fitzgeraldii</i>	+	
<i>Aristida contorta</i>	+	0.2
<i>Bulbostylis barbata</i>	+	0.1
<i>Corchorus lasiocarpus</i> ?subsp.	+	0.5
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.4
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.15
<i>Enneapogon caeruleus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila cryptothrix</i>	+	1.1
<i>Eremophila cuneifolia</i>	+	0.5
<i>Eremophila exilifolia</i>	+	1.1
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	1	1.5
<i>Eriachne aristidea</i>	+	0.2
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.4
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.2
<i>Euphorbia schultzei</i>	+	0.1
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Goodenia microptera</i>	+	0.3
<i>Grevillea berryana</i>	+	4.5
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	0.2
<i>Mollugo molluginea</i>	+	0.15

<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	+	0.2
<i>Polycarpaea corymbosa</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus calostachyus</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus fusiformis</i>	+	0.4
<i>Ptilotus obovatus</i>	+	0.2
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.5
<i>Scaevola acacioides</i>	+	1.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.2
<i>Solanum gabrielae</i>	+	0.5
<i>Solanum horridum</i>	+	0.2
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.5
<i>Trachymene pilbarensis</i>	+	0.5
<i>Tribulus suberosus</i>	+	0.7
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	+	0.8
<i>Triodia wiseana</i>	50	0.4
<i>Triumfetta clementii</i>	+	0.3
<i>Triumfetta maconochieana</i>	+	0.3

**API Resource Area****Site 1RA21****Location:** Hardey Resource Area.**Type:** Quadrat 50 x 50 m**1st Observation: Date:** 21/04/2009 **Described by:** JA**Seasonal Conditions:** E**2nd Observation: Date:** 12/05/2011 **Described by:** BV/DW**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 530852 mE**Northing:** 7461153 mN**Habitat:** Top of high rocky hill. Incline to the southeast.**Soil:** Red-brown sandy clay with ironstone pebbles.**Rock Type:** Ironstone pebbles.**Vegetation:** *Acacia rhodophloia* and *A. aptaneura* tall open shrubland over *Senna glutinosa* subsp. *glutinosa*, *Eremophila latrobei* and *Scaevola acacioides* open shrubland over *Triodia wiseana* open hummock grassland.**Vegetation Code:** Hi14**Vegetation Desc:** *Acacia rhodophloia*, *A. aptaneura* tall open shrubland over *Senna glutinosa* subsp. *glutinosa*, *Eremophila latrobei* subsp. *latrobei* over *Triodia wiseana* open hummock grassland.**Veg Condition:** Excellent.**Fire Age:** 5 - 10 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia aptaneura</i>	2	3.5
<i>Acacia citrinoviridis</i>	+	4.5
<i>Acacia maitlandii</i>	+	1.3
<i>Acacia marramamba</i>	+	2
<i>Acacia rhodophloia</i>	2	2.0
<i>Acacia synchronicia</i>	+	1.0
<i>Acacia tetragonophylla</i>	+	3
<i>Amyema fitzgeraldii</i>	+	
<i>Bulbostylis barbata</i>	+	0.2
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	
<i>Cymbopogon ambiguus</i>	+	1
<i>Cymbopogon obtectus</i>	+	0.5
<i>Dodonaea petiolaris</i>	+	1.0
<i>Enneapogon caeruleus</i>	+	0.3
<i>Enneapogon polyphyllus</i>	+	0.6
<i>Eremophila cryptothrix</i>	+	
<i>Eremophila cuneifolia</i>	+	1.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	+	0.8
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	1.0
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.4
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Grevillea berryana</i>	+	2.5
<i>Hibiscus coatesii</i>	+	0.2
<i>Maireana</i> ? <i>georgei</i>	+	0.15
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.5
<i>Oldenlandia crouchiana</i>	+	0.2
<i>Paspalidium clementii</i>	+	0.4
<i>Polycarpaea longiflora</i>	+	0.3
<i>Ptilotus astrolasius</i>	+	0.2
<i>Ptilotus fusiformis</i>	+	0.6

<i>Ptilotus obovatus</i>	+	0.5
<i>Scaevola acacioides</i>	+	1.8
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.5
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.3
<i>Sida echinocarpa</i>	+	0.4
<i>Solanum lasiophyllum</i>	+	0.6
<i>Sporobolus australasicus</i>	+	0.3
<i>Streptoglossa decurrens</i>	+	1.0
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.5
<i>Trachymene pilbarensis</i>	+	0.5
<i>Tribulus suberosus</i>	+	1
<i>Triodia angusta</i>	+	0.5
<i>Triodia wiseana</i>	50	0.5
<i>Triumfetta clementii</i>	+	0.4

**API Resource Area****Site 1RA22**

**Location:** Hardey Resource Area **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 21/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 12/05/2011 **Described by:** BV/DW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531177 mE **Northing:** 7461433 mN

**Habitat:** Northeast edge on top of high rocky hill.

**Soil:** Red-brown sandy clay with ironstone pebbles.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia aptaneura* (*A. pruinocarpa*) tall open shrubland over *Maireana georgei* low open shrubland over *Triodia wiseana* open hummock grassland.

**Vegetation Code:** Hi09

**Vegetation Desc:** *Acacia aptaneura*, *A. pruinocarpa* low open woodland to low woodland over *Eremophila cryptothrix*, *Eremophila latrobei* subsp. *latrobei* scattered shrubs to open shrubland over *Triodia wiseana* scattered hummock grasses to open hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** 5 - 10 years.

**Notes:** Phase 2 (2011): Drilling disturbance has occurred since 2009.

**Species List**

Name	% Cover	Height
<i>Acacia aptaneura</i>	5	3.0
<i>Acacia marramamba</i>	+	1.8
<i>Acacia pruinocarpa</i>	5-19	1.6
<i>Acacia rhodophloia</i>	+	2.0
<i>Acacia tetragonophylla</i>	+	2
<i>Amyema fitzgeraldii</i>	+	
<i>Cleome viscosa</i>	+	0.5
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	+	0.4
<i>Dodonaea petiolaris</i>	+	0.6
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.4
<i>Enneapogon polyphyllus</i>	+	0.7
<i>Eremophila cryptothrix</i>	+	1.5
<i>Eremophila cuneifolia</i>	+	0.6
<i>Eremophila exilifolia</i>	+	0.8
<i>Eremophila latrobei</i> subsp. <i>glabra</i>	+	0.8
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	0.8
<i>Eremophila longifolia</i>	+	0.4
<i>Eriachne mucronata</i>	+	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.3
<i>Gomphrena kanisii</i>	+	0.3
<i>Goodenia microptera</i>	+	0.6
<i>Hybanthus aurantiacus</i>	+	0.2
<i>Maireana georgei</i>	3	0.4
<i>Maireana ? georgei</i>	+	0.4
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.5
<i>Ptilotus calostachyus</i>	+	0.4
<i>Ptilotus fusiformis</i>	+	0.3
<i>Ptilotus obovatus</i>	+	0.7
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	1.0

<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.3
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.0
<i>Sida echinocarpa</i>	+	0.15
<i>Sida</i> sp. <i>spiciform panicles</i> (E. Leyland s.n. 14/8/90)	+	0.4
<i>Solanum ashbyae</i>	+	0.3
<i>Solanum lasiophyllum</i>	+	0.4
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	1.2
<i>Trachymene pilbarensis</i>	+	0.4
<i>Tribulus suberosus</i>	+	1
<i>Trichodesma zeylanicum</i> ?var.	+	0.5
<i>Triodia wiseana</i>	30	0.5
<i>Triumfetta clementii</i>	+	0.4



**API Resource Area****Site 1RA23**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 21/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 12/05/2011 **Described by:** JA/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531629 mE **Northing:** 7461343 mN

**Habitat:** Southeast edge on top of high rocky hill.

**Soil:** Red-brown sandy clay, lots of rocky outcrops.

**Rock Type:** Not recorded.

**Vegetation:** *Acacia aptaneura* (*A. pruinocarpa*) low open woodland over *Tribulus suberosus* scattered low shrubs over *Triodia wiseana* hummock grassland.

**Vegetation Code:** Hi09

**Vegetation Desc:** *Acacia aptaneura*, *A. pruinocarpa* low open woodland to low woodland over *Eremophila cryptothrix*, *Eremophila latrobei* subsp. *latrobei* scattered shrubs to open shrubland over *Triodia wiseana* scattered hummock grasses to open hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:**

**Species List**

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	1
<i>Acacia aptaneura</i>	3	6.0
<i>Acacia pruinocarpa</i>	1	4.0
<i>Acacia tetragonophylla</i>	+	2.5
<i>Aerva javanica</i>	+	0.15
<i>Amaranthus cuspidifolius</i>	+	0.4
<i>Aristida contorta</i>	+	0.2
<i>Bulbostylis barbata</i>	+	0.05
<i>Cenchrus ciliaris</i>	+	0.3
<i>Cleome viscosa</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.6
<i>Dodonaea pachyneura</i>	+	2.0
<i>Dodonaea petiolaris</i>	+	0.2
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Enneapogon caeruleus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila cryptothrix</i>	+	1.5
<i>Eremophila cuneifolia</i>	+	0.8
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	1.2
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.2
<i>Eriachne mucronata</i> (typical form)	+	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.5
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.2
<i>Gomphrena cunninghamii</i>	+	0.05
<i>Goodenia microptera</i>	+	0.3
<i>Goodenia muelleriana</i>	+	0.3
<i>Grevillea berryana</i>	+	1
<i>Hibiscus coatesii</i>	+	0.15
<i>Hybanthus aurantiacus</i>	+	0.2
<i>Keraudrenia nephrosperma</i>	+	0.2
<i>Maireana villosa</i>	+	0.25

<i>Mollugo molluginea</i>	+	0.15
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.4
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.15
<i>Polycarpaea corymbosa</i>	+	0.2
<i>Polycarpaea longiflora</i>	+	0.4
<i>Portulaca oleracea</i>	+	0.1
<i>Pterocaulon sphaeranthoides</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.3
<i>Ptilotus calostachyus</i>	+	0.5
<i>Ptilotus clementii</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.4
<i>Ptilotus fusiformis</i>	+	0.4
<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>	+	0.15
<i>Ptilotus obovatus</i>	+	0.5
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.5
<i>Senna notabilis</i>	+	0.2
<i>Sida echinocarpa</i>	+	0.15
<i>Solanum gabrielae</i>	+	0.4
<i>Solanum lasiophyllum</i>	+	1
<i>Sporobolus australasicus</i>	+	0.2
<i>Swainsona complanata</i>	+	0.5
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.5
<i>Trachymene pilbarensis</i>	+	0.4
<i>Tribulus suberosus</i>	1	1.0
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	30	0.4
<i>Triumfetta clementii</i>	+	0.4

**API Resource Area****Site 1RA24**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 21/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 12/05/2011 **Described by:** BV/DW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531367 mE **Northing:** 7461453 mN

**Habitat:** North side on top of high rocky hill with outcropping ironstone.

**Soil:** Very shallow red-brown sandy clay with ironstone pebbles.

**Rock Type:** Ironstone pebbles.

**Vegetation:** *Acacia rhodophloia* and *A. pruinocarpa* (*A. aptaneura*) tall open shrubland over *Triodia wiseana* open hummock grassland with scattered sedges and tussock grasses.

**Vegetation Code:** Hi14

**Vegetation Desc:** *Acacia rhodophloia*, *A. aptaneura* tall open shrubland over *Senna glutinosa* subsp. *glutinosa*, *Eremophila latrobei* subsp. *latrobei* over *Triodia wiseana* open hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** 5 - 10 years.

**Notes:** Phase 2 (2011): Clearing disturbance has occurred since 2009, in southern section of quadrat.

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia aptaneura</i>	1	2.5
<i>Acacia marramamba</i>	+	0.5
<i>Acacia pruinocarpa</i>	2	3.0
<i>Acacia rhodophloia</i>	2	3.0
<i>Amyema fitzgeraldii</i>	+	
<i>Boerhavia coccinea</i>	+	0.05
<i>Bulbostylis barbata</i>	+	0.2
<i>Cleome viscosa</i>	+	0.5
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>	+	0.3
<i>Corchorus crozophorifolius</i>	+	0.3
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.6
<i>Corymbia ferriticola</i>	+	3.5
<i>Corymbia flavescens</i>	+	4
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	+	0.15
<i>Dodonaea petiolaris</i>	+	0.5
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.4
<i>Enneapogon lindleyanus</i>	+	0.3
<i>Enneapogon polyphyllus</i>	+	0.4
<i>Eremophila cryptothrix</i>	+	1
<i>Eremophila cuneifolia</i>	+	0.6
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	1.2
<i>Eremophila longifolia</i>	+	1.2
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.1
<i>Gomphrena cunninghamii</i>	+	0.5
<i>Gomphrena kanisii</i>	+	0.3
<i>Goodenia stobbsiana</i>	+	0.15
<i>Grevillea berryana</i>	+	2.5
<i>Hibiscus coatesii</i>	+	0.8
<i>Mollugo molluginea</i>	+	0.15
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.1

<i>Paspalidium clementii</i>	+	0.3
<i>Polycarpaea longiflora</i>	+	0.25
<i>Portulaca pilosa</i>	+	0.2
<i>Pterocaulon sphaeranthoides</i>	+	0.5
<i>Ptilotus auriculifolius</i>	+	0.6
<i>Ptilotus calostachyus</i>	+	0.6
<i>Ptilotus clementii</i>	+	1.0
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	1.0
<i>Ptilotus fusiformis</i>	+	0.5
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.4
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.4
<i>Senna notabilis</i>	+	0.4
<i>Sida echinocarpa</i>	+	0.4
<i>Solanum gabrielae</i>	+	0.35
<i>Solanum lasiophyllum</i>	+	0.6
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.2
<i>Trachymene pilbarensis</i>	+	0.25
<i>Tribulus suberosus</i>	+	1.0
<i>Trichodesma zeylanicum</i> ?var.	+	0.5
<i>Triodia wiseana</i>	12	0.6
<i>Tripogon loliiformis</i>	+	0.15
<i>Triumfetta clementii</i>	+	0.4

**API Resource Area****Site 1RA25**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 21/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 7/04/2011 **Described by:** JAAB **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530845 mE **Northing:** 7461578 mN

**Habitat:** Southeast facing slope into narrow valley.

**Soil:** Patches of red loam grading into skeletal soil with rocks and gravel, forming a surface sediment.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia aptaneura* (*A. pruinocarpa*) low woodland over *Scaevola acacioides* and *Dodonaea petiolaris* open shrubland over *Triodia wiseana* and *Triodia angusta* open hummock grassland.

**Vegetation Code:** Hi08

**Vegetation Desc:** *Acacia aptaneura* low open woodland over *Senna* spp. and *Eremophila* spp. scattered shrubs to open shrubland over *Triodia wiseana* (*T. angusta*) very open hummock grassland.

**Veg Condition:** Good (Cattle grazing present) (2009). Excellent (2011).

**Fire Age:** >10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia aptaneura</i>	20	6.0
<i>Acacia pruinocarpa</i>	1	6.0
<i>Acacia rhodophloia</i>	+	2
<i>Acacia synchronicia</i>	+	1.5
<i>Acacia tetragonophylla</i>	+	2.5
<i>Acacia xiphophylla</i>	1	4.5
<i>Amaranthus mitchellii</i>	+	
<i>Amyema fitzgeraldii</i>	+	
<i>Aristida contorta</i>	+	0.15
<i>Bidens bipinnata</i>	+	0.4
<i>Boerhavia coccinea</i>	+	0.1
<i>Bulbostylis barbata</i>	+	0.2
<i>Cenchrus ciliaris</i>	+	0.4
<i>Cleome viscosa</i>	+	0.3
<i>Corchorus crozophorifolius</i>	+	0.15
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon obtectus</i>	+	1.0
<i>Dodonaea petiolaris</i>	1	1.4
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Enneapogon lindleyanus</i>	+	0.15
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eremophila cryptothrix</i>	+	1.2
<i>Eremophila cuneifolia</i>	+	1.2
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	1.0
<i>Eremophila longifolia</i>	+	2.0
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>	+	2.0
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	1	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.15
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.1
<i>Goodenia muelleriana</i>	+	0.2
<i>Goodenia tenuiloba</i>	+	0.1

<i>Iseilema membranaceum</i>	+	0.3
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	0.2
<i>Lepidium pedicellosum</i>	+	0.1
<i>Maireana</i> ? <i>georgei</i>	+	0.2
<i>Maireana melanocoma</i>	+	0.3
<i>Maireana planifolia</i>	+	0.3
<i>Maireana villosa</i>	+	0.4
<i>Nicotiana</i> ? <i>umbratica</i>	+	0.15
<i>Nicotiana occidentalis</i> ? <i>subsp.</i>	+	0.2
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.2
<i>Perotis rara</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.3
<i>Ptilotus calostachyus</i>	+	0.5
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus fusiformis</i>	+	0.3
<i>Ptilotus obovatus</i>	+	0.8
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.5
<i>Rhagodia eremaea</i>	+	1.2
<i>Scaevola acacioides</i>	1	1.5
<i>Sclerolaena costata</i>	+	0.2
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.0
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.5
<i>Sida echinocarpa</i>	+	0.15
<i>Solanum horridum</i>	+	0.2
<i>Solanum lasiophyllum</i>	+	0.3
<i>Stemodia grossa</i>	+	0.15
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.1
<i>Tribulus suberosus</i>	+	0.5
<i>Trichodesma zeylanicum</i> ? <i>var.</i>	+	0.2
<i>Triodia angusta</i>	10	0.4
<i>Triodia wiseana</i>	30	0.4
<i>Triumfetta clementii</i>	+	

**API Resource Area****Site 1RA26**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 19/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 9/05/2011 **Described by:** JADW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531297 mE **Northing:** 7461601 mN

**Habitat:** Northwest facing slope.

**Soil:** Skeletal gravel, loam.

**Rock Type:** Ironstone with metamorphosed mudstone bands.

**Vegetation:** *Acacia aptaneura* low open woodland over *Senna glutinosa* subsp. *x luerssenii* and *S. glutinosa* subsp. *glutinosa* open shrubland over *S. stricta* low shrubland over *Triodia wiseana* open hummock grassland.

**Vegetation Code:** Hi08

**Vegetation Desc:** *Acacia aptaneura* low open woodland over *Senna* spp. and *Eremophila* spp. scattered shrubs to open shrubland over *Triodia wiseana* (*T. angusta*) very open hummock grassland.

**Veg Condition:** Good (evidence of some grazing) (2009). Excellent (2011).

**Fire Age:** >10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon dioicum</i>	+	0.3
<i>Acacia aptaneura</i>	3	3
<i>Acacia marramamba</i>	+	1.1
<i>Acacia synchronicia</i>	1	1.2
<i>Acacia xiphophylla</i>	+	2
<i>Amaranthus cuspidifolius</i>	+	0.3
<i>Amyema fitzgeraldii</i>	+	
<i>Boerhavia coccinea</i>	+	0.15
<i>Bulbostylis barbata</i>	+	
<i>Cleome viscosa</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.4
<i>Enneapogon caeruleus</i>	+	0.3
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila cryptothrix</i>	+	0.6
<i>Eremophila cuneifolia</i>	+	1.1
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.15
<i>Euphorbia schultzei</i>	+	0.1
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Lepidium pedicellosum</i>	+	0.3
<i>Maireana ? triptera</i>	+	0.2
<i>Maireana georgei</i>	+	0.3
<i>Mollugo molluginea</i>	+	0.2
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.4
<i>Pterocaulon sphaeranthoides</i>	+	0.1
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus calostachyus</i>	+	0.5

<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.1
<i>Ptilotus obovatus</i>	+	1.5
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.6
<i>Scaevola acacioides</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	+	0.4
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	1	1.6
<i>Senna stricta</i>	10	1.0
<i>Sida clementii</i>	+	0.3
<i>Sporobolus australasicus</i>	+	0.2
<i>Tribulus suberosus</i>	+	0.7
<i>Triodia wiseana</i>	10	0.4
<i>Triumfetta clementii</i>	+	0.2



## API Resource Area

Site 1RA27

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 21/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation:** **Date:** 9/05/2011 **Described by:** JADW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531503 mE **Northing:** 7461624 mN

**Habitat:** North facing rocky slope with small crags.

**Soil:** Skeletal soil, with red loam in patches and a stony mantle.

**Rock Type:** Ironstone with some mudstone deposits.

**Vegetation:** *Acacia aptaneura* low open woodland over *A. synchronicia* and *A. pruinocarpa* scattered tall shrubs over *Senna glutinosa* subsp. *glutinosa*, *S. glutinosa* subsp. *glutinosa* x *stricta* and *Eremophila cryptothrix* open shrubland over *Triodia wiseana* very open hummock grassland.

**Vegetation Code:** Hi08

**Vegetation Desc:** *Acacia aptaneura* low open woodland over *Senna* spp. and *Eremophila* spp. scattered shrubs to open shrubland over *Triodia wiseana* (*T. angusta*) very open hummock grassland.

**Veg Condition:** Good (2009). Excellent (2011).

**Fire Age:** >7 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia aptaneura</i>	5	
<i>Acacia pruinocarpa</i>	+	3.0
<i>Acacia synchronicia</i>	1	3.0
<i>Acacia xiphophylla</i>	+	4.0
<i>Amaranthus cuspidifolius</i>	+	0.1
<i>Aristida contorta</i>	+	0.3
<i>Boerhavia coccinea</i>	+	0.15
<i>Bulbostylis barbata</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.4
<i>Cleome viscosa</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.5
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	+	0.1
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	+	0.2
<i>Digitaria ctenantha</i>	+	0.2
<i>Dodoniaea pachyneura</i>	+	1.5
<i>Dodoniaea petiolaris</i>	+	1.0
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.15
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eremophila cryptothrix</i>	1.5	0.3
<i>Eremophila cuneifolia</i>	+	0.5
<i>Eremophila</i> sp.	+	0.6
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.2
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.2
<i>Gomphrena cunninghamii</i>	+	0.15
<i>Lepidium pedicellosum</i>	+	
<i>Maireana villosa</i>	+	0.4
<i>Mollugo molluginea</i>	+	0.1
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.1

<i>Paspalidium clementii</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.2
<i>Pterocaulon sphaeranthoides</i>	+	0.1
<i>Ptilotus auriculifolius</i>	+	0.6
<i>Ptilotus calostachyus</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.1
<i>Ptilotus obovatus</i>	+	0.6
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.5
<i>Rhagodia eremaea</i>	+	1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	5	1.6
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	1	1.1
<i>Stemodia grossa</i>	+	0.3
<i>Trachymene pilbarensis</i>	+	0.2
<i>Tribulus suberosus</i>	+	0.4
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	8	0.4
<i>Triumfetta clementii</i>	+	0.2

**API Resource Area****Site 1RA28**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 20/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation:** **Date:** 9/05/2011 **Described by:** BV/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 532209 mE **Northing:** 7461409 mN

**Habitat:** North facing slope with outcrop at crest of hill at south end. Scattered small rock pavements throughout slope.

**Soil:** Patches of red loam, but mostly skeletal soils with gravel and stone mantle.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia arida* shrubland over *Triodia wiseana* hummock grassland.

**Vegetation Code:** HBr4

**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.

**Veg Condition:** Excellent (2009). Good (2011).

**Fire Age:** 5 - 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia arida</i>	10	1.5
<i>Acacia kempeana</i>	+	1.0
<i>Acacia pruinocarpa</i>	+	1.2
<i>Amaranthus cuspidifolius</i>	+	0.3
<i>Amaranthus mitchellii</i>	+	0.3
<i>Aristida contorta</i>	+	0.4
<i>Boerhavia coccinea</i>	+	0.2
<i>Bonamia media</i> var. <i>villosa</i>	+	0.05
<i>Cenchrus ciliaris</i>	+	0.5
<i>Cleome viscosa</i>	+	0.6
<i>Corchorus laniflorus</i>	+	0.3
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.8
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Enneapogon lindleyanus</i>	+	0.1
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Eremophila cuneifolia</i>	+	0.5
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	
<i>Euphorbia schultzei</i>	+	0.08
<i>Euphorbia wheeleri</i>	+	0.2
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Gomphrena kanisii</i>	+	0.3
<i>Goodenia microptera</i>	+	0.1
<i>Hibiscus coatesii</i>	+	0.1
<i>Hybanthus aurantiacus</i>	+	1.5
<i>Iseilema eremaeum</i>	+	0.15
<i>Mollugo molluginea</i>	+	0.15
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.2
<i>Paspalidium clementii</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.25
<i>Portulaca pilosa</i>	+	0.1
<i>Pterocaulon sphaeranthoides</i>	+	0.2

<i>Ptilotus aervoides</i>	+	climber
<i>Ptilotus auriculifolius</i>	+	0.8
<i>Ptilotus obovatus</i>	+	0.5
<i>Rhynchosia minima</i>	+	climber
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.4
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	0.3
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	2
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1	1
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	1.0
<i>Senna stricta</i>	+	1.5
<i>Sida echinocarpa</i>	+	0.3
<i>Solanum ellipticum</i>	+	0.1
<i>Solanum horridum</i>	+	0.3
<i>Sporobolus australasicus</i>	+	0.15
<i>Tephrosia densa</i>	+	0.3
<i>Tephrosia rosea</i> var. <i>rosea</i>	+	0.2
<i>Themeda triandra</i>	+	0.4
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.3
<i>Tribulus suberosus</i>	+	0.8
<i>Trichodesma zeylanicum</i> ?var.	+	0.5
<i>Triodia wiseana</i>	70	0.6
<i>Triumfetta clementii</i>	+	0.6
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>	+	0.2

**API Resource Area****Site 1RA29**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 19/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation:** **Date:** 7/04/2011 **Described by:** JAAB **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 532586 mE **Northing:** 7461028 mN

**Habitat:** Hill crest and south facing slope.

**Soil:** Red loam with stony mantle.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia arida* open shrubland over *Triodia wiseana* hummock grassland.

**Vegetation Code:** HBr4

**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.

**Veg Condition:** Good (some cattle grazing present) (2009). Excellent (2011).

**Fire Age:** > 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon lepidum</i>	+	0.1
<i>Acacia arida</i>	3	2.0
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	2
<i>Aristida contorta</i>	+	0.1
<i>Boerhavia coccinea</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.4
<i>Cleome viscosa</i>	+	0.2
<i>Corchorus laniflorus</i>	+	0.3
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.1
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Enneapogon caeruleus</i>	+	0.1
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eremophila cuneifolia</i>	+	0.5
<i>Euphorbia australis</i>	+	0.1
<i>Euphorbia</i> sp. (PAN5-15)	+	0.002m
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.2
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.1
<i>Goodenia</i> sp.	+	
<i>Iseilema eremaeum</i>	+	0.05
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.25
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.1
<i>Polycarpaea corymbosa</i>	+	0.1
<i>Polycarpaea holtzei</i>	+	0.05
<i>Polycarpaea longiflora</i>	+	0.2
<i>Portulaca oleracea</i>	+	0.1
<i>Pterocaulon sphaeranthoides</i>	+	0.15
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.2
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.15
<i>Ptilotus obovatus</i>	+	0.8

<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.6
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	2
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.2
<i>Sida echinocarpa</i>	+	0.1
<i>Solanum lasiophyllum</i>	+	0.4
<i>Sporobolus australasicus</i>	+	0.15
<i>Stemodia grossa</i>	+	0.15
<i>Swainsona decurrens</i>	+	0.15
<i>Trachymene</i> sp.	+	0.2
<i>Tribulus suberosus</i>	+	0.5
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	45	0.5
<i>Triumfetta clementii</i>	+	0.2

## API Resource Area

Site 1RA30

Location: Hardey Resource Area.

Type: Quadrat 50 x 50 m

1st Observation: Date: 19/04/2009

Described by: JA

Seasonal Conditions: E

2nd Observation: Date: 24/05/2011

Described by: BVCW

Seasonal Conditions: E

MGA Zone: 50

Easting: 530155 mE

Northing: 7462353 mN

Habitat: Gentle incline to the west on top of rocky hill.

Soil: Dark red-brown sandy clay with ironstone pebble layer.

Rock Type: Ironstone.

Vegetation: *Acacia pruinocarpa* tall shrubland over *Triodia angusta* open hummock grassland.

Vegetation Code: Hi16

Vegetation Desc: *Acacia pruinocarpa* scattered low trees to low woodland over *Acacia marramamba* scattered shrubs over *Triodia wiseana* hummock grassland.

Veg Condition: Excellent.

Fire Age: 5 - 10 years.

Notes:

## Species List

Name	% Cover	Height
<i>Acacia aptaneura</i>	+	2.0
<i>Acacia marramamba</i>	+	1.25
<i>Acacia pruinocarpa</i>	30	1.5
<i>Corchorus crozophorifolius</i>	+	0.4
<i>Cymbopogon ambiguus</i>	+	1.2
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Eriachne mucronata</i>	+	0.4
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	+	0.2
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.25
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Grevillea berryana</i>	+	2
<i>Indigofera monophylla</i>	+	0.3
<i>Mollugo molluginea</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Pterocaulon sphaeranthoides</i>	+	0.3
<i>Ptilotus axillaris</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.3
<i>Ptilotus fusiformis</i>	+	0.4
<i>Ptilotus obovatus</i>	+	0.4
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.7
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.8
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>x luerksenii</i>	+	1.0
<i>Solanum lasiophyllum</i>	+	0.5
<i>Streptoglossa decurrens</i>	+	0.2
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.4
<i>Trachymene pilbarensis</i>	+	0.4
<i>Tribulus suberosus</i>	+	0.5
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	+	0.8
<i>Triodia ? angusta</i>	60	0.6
<i>Triodia wiseana</i>	60-70	0.4

## API Resource Area

Site 1RA31

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 19/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 11/05/2011 **Described by:** JA/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529650 mE **Northing:** 7462603 mN

**Habitat:** Undulating western edge of rocky hill.

**Soil:** Red-brown sandy clay with ironstone rocks and outcropping.

**Rock Type:** Ironstone.

**Vegetation:** *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Acacia pruinocarpa* scattered tall shrubs over *A. hamersleyensis* scattered shrubs over *Triodia wiseana* hummock grassland.

**Vegetation Code:** Hi16

**Vegetation Desc:** *Acacia pruinocarpa* scattered low trees to low woodland over *Acacia marramamba* scattered shrubs over *Triodia wiseana* hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:** 2<sup>nd</sup> Observation (2011): Tracks and drill pad cleared through quadrat, approximately 30% of the quadrat disturbed since 2009.

## Species List

Name	% Cover	Height
<i>Acacia bivenosa</i>	+	0.5
<i>Acacia hamersleyensis</i>	1	2.2
<i>Acacia maitlandii</i>	+	2
<i>Acacia marramamba</i>	+	1.1
<i>Acacia pruinocarpa</i>	1	3.5
<i>Aristida contorta</i>	+	0.2
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>	+	1.4
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	
<i>Enneapogon caeruleus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila tietkensis</i>	+	0.2
<i>Eriachne mucronata</i> (typical form)	+	0.5
<i>Eriachne pulchella</i> ?subsp.	+	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	5	4.0
<i>Gomphrena cunninghamii</i>	+	0.15
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	climber
<i>Paspalidium clementii</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus fusiformis</i>	+	0.4
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.5
<i>Scaevola acacioides</i>	+	1
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.7
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.8
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.8
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.2
<i>Senna stricta</i>	+	0.5



<i>Solanum lasiophyllum</i>	+	0.5
<i>Stylobasium spathulatum</i>	+	1.0
<i>Trachymene oleracea subsp. oleracea</i>	+	0.2
<i>Tribulus suberosus</i>	+	1
<i>Triodia wiseana</i>	40	0.4

## API Resource Area

Site 1RA32

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 19/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation:** **Date:** 11/05/2011 **Described by:** JA/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529487 mE **Northing:** 7462313 mN

**Habitat:** Top of rocky hill. Gentle incline to north-west.

**Soil:** Red-brown dark sandy clay with outcropping ironstone.

**Rock Type:** Ironstone.

**Vegetation:** *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Acacia pruinocarpa* tall open shrubland over *Triodia wiseana* hummock grassland.

**Vegetation Code:** Hi16

**Vegetation Desc:** *Acacia pruinocarpa* scattered low trees to low woodland over *Acacia marramamba* scattered shrubs over *Triodia wiseana* hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:** 2<sup>nd</sup> Observation (2011): Drilling disturbance has occurred since 2009, in southwest corner of quadrat.

## Species List

Name	% Cover	Height
<i>Acacia bivenosa</i>	+	2.0
<i>Acacia marramamba</i>	+	1.3
<i>Acacia pruinocarpa</i>	7	3.0
<i>Amaranthus mitchellii</i>	+	0.3
<i>Codonocarpus cotinifolius</i>	+	3.0
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila latrobei</i> ?subsp.	+	0.5
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.2
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	3	6.5
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.2
<i>Gomphrena cunninghamii</i>	+	0.15
<i>Oldenlandia crouchiana</i>	+	0.2
<i>Paspalidium clementii</i>	+	0.2
<i>Polycarpaea longiflora</i>	+	0.3
<i>Portulaca oleracea</i>	+	0.1
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.5
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.15
<i>Ptilotus fusiformis</i>	+	0.3
<i>Ptilotus obovatus</i>	+	0.3
<i>Scaevola acacioides</i>	+	0.5
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.7
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	0.5
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.8
<i>Sida</i> sp. <i>Pilbara</i> (A.A Mitchell PRP 1543)	+	0.15
<i>Solanum gabrielae</i>	+	0.5
<i>Stylobasium spathulatum</i>	+	2.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.2
<i>Tribulus suberosus</i>	+	1.2
<i>Trichodesma zeylanicum</i> ?var.	+	0.4

<i>Triodia wiseana</i>	40	0.4
<i>Tripogon loliiformis</i>	+	0.15

**API Resource Area****Site 1RA33**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 19/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 24/05/2011 **Described by:** BVCW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529968 mE **Northing:** 7462239 mN

**Habitat:** West side on top of rocky hill.

**Soil:** Red-brown sandy clay with ironstone pebbles.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia pruinocarpa* tall open scrub over *Triodia angusta* hummock grassland.

**Vegetation Code:** Hi16

**Vegetation Desc:** *Acacia pruinocarpa* scattered low trees to low woodland over *Acacia marramamba* scattered shrubs over *Triodia wiseana* hummock grassland.

**Veg Condition:** Excellent (2009). Fair (2011).

**Fire Age:** 5 - 10 years.

**Notes:** 2<sup>nd</sup> Observation (2011): Drilling disturbance has occurred, approximately 60% of the quadrat disturbed since 2009.

**Species List**

Name	% Cover	Height
<i>Acacia kempeana</i>	+	3
<i>Acacia marramamba</i>	+	1.3
<i>Acacia pruinocarpa</i>	40	3.0
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	0.4
<i>Cymbopogon ambiguus</i>	+	1
<i>Duperreya commixta</i>	+	0.5
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Eremophila latrobei</i> ?subsp.	+	1
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.3
<i>Eriachne pulchella</i> ?subsp.	+	0.05
<i>Indigofera monophylla</i>	+	0.2
<i>Maireana planifolia</i>	+	0.4
<i>Marsdenia australis</i>	+	climber
<i>Nicotiana occidentalis</i> ?subsp.	+	0.1
<i>Oldenlandia crouchiana</i>	+	0.3
<i>Peripleura arida</i>	+	0.6
<i>Polycarpaea longiflora</i>	+	0.2
<i>Pterocaulon sphaeranthoides</i>	+	0.6
<i>Ptilotus auriculifolius</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.4
<i>Ptilotus fusiformis</i>	+	0.5
<i>Ptilotus obovatus</i>	+	0.6
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.3
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.5
<i>Senna notabilis</i>	+	0.2
<i>Solanum lasiophyllum</i>	+	0.4
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.5
<i>Trachymene pilbarensis</i>	+	0.5
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia</i> ? <i>angusta</i>	40	0.7
<i>Triodia wiseana</i>	10	0.5

**API Resource Area****Site 1RA34**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 20/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation:** **Date:** 24/05/2011 **Described by:** BM/JK **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530660 mE **Northing:** 7462218 mN

**Habitat:** Outcropping angular ironstone ridge of low rocky hill.

**Soil:** Dark red-brown loamy clay with stony layer.

**Rock Type:**

**Vegetation:** *Senna glutinosa* subsp. *glutinosa* scattered tall shrubs over *Triodia angusta* and *T. wiseana* hummock grassland.

**Vegetation Code:** Hi03

**Vegetation Desc:** *Triodia wiseana* (*T. angusta*) hummock grassland with *Senna* spp., *Stylobasium spathulatum*, *Acacia synchronicia* scattered shrubs to open shrubland.

**Veg Condition:** Excellent.

**Fire Age:** 5 - 10 years.

**Notes:** 2<sup>nd</sup> Observation (2011): Track has been cleared through southern half of quadrat since 2009, relevé surveyed instead beginning at northwest corner of quadrat.

**Species List**

Name	% Cover	Height
<i>Acacia pruinocarpa</i>	+	1
<i>Acacia synchronicia</i>	+	0.4
<i>Bulbostylis barbata</i>	+	0.15
<i>Cenchrus ciliaris</i>	+	0.4
<i>Cheilanthes lasiophylla</i>	+	0.05
<i>Cleome viscosa</i>	+	0.3
<i>Corchorus laniflorus</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.5
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.3
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Eremophila cryptothrix</i>	+	2.0
<i>Eremophila cuneifolia</i>	+	0.5
<i>Eremophila longifolia</i>	+	0.5
<i>Eriachne mucronata</i>	+	0.4
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.2
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	+	3.5
<i>Euphorbia boophthona/tannensis</i>	+	0.5
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.3
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Maireana ? georgei</i>	+	0.15
<i>Maireana melanocoma</i>	+	0.2
<i>Mollugo molluginea</i>	+	0.15
<i>Nicotiana benthamiana</i>	+	0.4
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.2
<i>Polycarpaea longiflora</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.5
<i>Ptilotus obovatus</i>	+	0.3
<i>Scaevola acacioides</i>	+	1.0

<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	3.0
<i>Solanum ferocissimum</i>	+	0.3
<i>Solanum horridum</i>	+	0.2
<i>Solanum</i> sp.	+	0.3
<i>Stylobasium spathulatum</i>	+	2
<i>Triodia angusta</i>	40	0.4
<i>Triodia wiseana</i>	10	0.4
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>	+	0.05

## API Resource Area

Site 1RA35

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 20/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation:** **Date:** 24/05/2011 **Described by:** JATD **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530029 mE **Northing:** 7462584 mN

**Habitat:** Breakaway rock formation forming steep sided ridge running east-west.

**Soil:** Only patches of skeletal loamy soil in parts, mostly rock pavement

**Rock Type:** Iron-rich black volcanic.

**Vegetation:** *Acacia aptaneura* and *A. pruinocarpa* scattered low trees over *Triodia wiseana* (*T. angusta*) open hummock grassland.

**Vegetation Code:** Hi08

**Vegetation Desc:** *Acacia aptaneura* low open woodland over *Senna* spp. and *Eremophila* spp. scattered shrubs to open shrubland over *Triodia wiseana* (*T. angusta*) very open hummock grassland.

**Veg Condition:** Good (2009). Excellent (2011).

**Fire Age:** <10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia aptaneura</i>	1	0.4
<i>Acacia bivenosa</i>	+	1.5
<i>Acacia marramamba</i>	+	1.5
<i>Acacia pruinocarpa</i>	1	3.5
<i>Acacia synchronicia</i>	+	1.5
<i>Amaranthus cuspidifolius</i>	+	0.3
<i>Aristida contorta</i>	+	0.4
<i>Bulbostylis barbata</i>	+	0.2
<i>Cleome viscosa</i>	+	0.4
<i>Cymbopogon ambiguus</i>	+	1
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	+	0.4
<i>Dodonaea pachyneura</i>	+	0.6
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila cryptothrix</i>	+	0.5
<i>Eremophila cuneifolia</i>	+	0.6
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	0.7
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.3
<i>Eriachne mucronata</i> (typical form)	+	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.5
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.8
<i>Grevillea berryana</i>	+	1.5
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	0.2
<i>Lepidium pedicellosum</i>	+	0.2
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.2
<i>Maireana georgei</i>	+	0.2
<i>Mollugo molluginea</i>	+	0.15
<i>Nicotiana occidentalis</i> ?subsp.	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.3
<i>Pterocaulon sphaeranthoides</i>	+	0.4

<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.1
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.5
<i>Ptilotus fusiformis</i>	+	0.4
<i>Ptilotus obovatus</i>	+	0.4
<i>Scaevola acacioides</i>	+	0.7
<i>Schizachyrium fragile</i>	+	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.5
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1
<i>Solanum gabrielae</i>	+	0.4
<i>Solanum horridum</i>	+	0.3
<i>Stemodia grossa</i>	+	0.3
<i>Tribulus suberosus</i>	+	1
<i>Triodia wiseana</i>	20	0.45
<i>Triumfetta clementii</i>	+	0.2



**API Resource Area****Site 1RA36**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 20/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 8/05/2011 **Described by:** JADW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529495 mE **Northing:** 7461654 mN

**Habitat:** East side of high rocky hill.

**Soil:** Red-brown sandy clay with ironstone pebbles.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia pruinocarpa* tall open shrubland over *A. marramamba* scattered shrubs over *A. spondylophylla* low open shrubland over *Triodia wiseana* hummock grassland.

**Vegetation Code:** Hi19

**Vegetation Desc:** *Eucalyptus leucophloia* subsp. *leucophloia* and *Acacia pruinocarpa* scattered low trees to low open woodland over *A. marramamba* and *A. spondylophylla* scattered shrubs to open heath over *Triodia wiseana* hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:** 2<sup>nd</sup> Observation (2011): Drilling disturbance has occurred on eastern edge of quadrat since 2009.

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia maitlandii</i>	+	2.5
<i>Acacia marramamba</i>	1	1.3
<i>Acacia pruinocarpa</i>	5	3.0
<i>Acacia rhodophloia</i>	+	1.4
<i>Acacia spondylophylla</i>	7	0.4
<i>Bulbostylis barbata</i>	+	0.1
<i>Cleome viscosa</i>	+	0.5
<i>Cymbopogon ambiguus</i>	+	0.6
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	
<i>Eremophila latrobei</i> subsp. <i>glabra</i>	+	0.8
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	1.2
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.4
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.1
<i>Grevillea berryana</i>	+	1.0
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	+	0.2
<i>Polycarpaea longiflora</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.15
<i>Ptilotus fusiformis</i>	+	0.4
<i>Scaevola acacioides</i>	+	0.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.4
<i>Solanum gabrielae</i>	+	0.3
<i>Solanum lasiophyllum</i>	+	0.5
<i>Tribulus suberosus</i>	+	0.6
<i>Triodia wiseana</i>	30	0.5

**API Resource Area****Site 1RA37**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 22/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 24/05/2011 **Described by:** BVCW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529618 mE **Northing:** 7460644 mN

**Habitat:** North-west facing slope in narrow valley.

**Soil:** Red loam with stones and gravel matrix.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia arida* scattered shrubs over *Triodia wiseana*.

**Vegetation Code:** HBr4

**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.

**Veg Condition:** Good.

**Fire Age:** < 10 years (2009). 2 - 5 years (2011).

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia arida</i>	1	1.8
<i>Aristida contorta</i>	+	0.3
<i>Boerhavia coccinea</i>	+	0.1
<i>Bulbostylis barbata</i>	+	0.1
<i>Cleome viscosa</i>	+	0.5
<i>Corchorus lasiocarpus</i> ?subsp.	+	0.4
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.2
<i>Cymbopogon ambiguus</i>	+	0.6
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Eremophila cuneifolia</i>	+	1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.4
<i>Euphorbia australis</i>	+	0.2
<i>Euphorbia boophthona</i>	+	0.3
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Gomphrena kanisii</i>	+	0.2
<i>Goodenia microptera</i>	+	0.25
<i>Heliotropium inexplicitum</i>	+	0.1
<i>Hibiscus gardneri</i>	+	0.4
<i>Hybanthus aurantiacus</i>	+	0.04
<i>Indigofera monophylla</i>	+	0.2
<i>Iseilema eremaeum</i>	+	0.2
<i>Mollugo molluginea</i>	+	0.4
<i>Oldenlandia crouchiana</i>	+	0.2
<i>Paspalidium clementii</i>	+	0.3
<i>Polycarpaea longiflora</i>	+	0.3
<i>Portulaca oleracea</i>	+	0.1
<i>Pterocaulon sphaeranthoides</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.7
<i>Rhynchosia minima</i>	+	climber
<i>Schizachyrium fragile</i>	+	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.6
<i>Sida echinocarpa</i>	+	0.2
<i>Sporobolus australasicus</i>	+	0.3
<i>Trachymene pilbarensis</i>	+	0.4

<i>Trichodesma zeylanicum</i> ?var.	+	0.6
<i>Triodia wiseana</i>	50	0.5
<i>Triumfetta clementii</i>	+	0.3

**API Resource Area****Site 1RA38**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 22/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 25/05/2011 **Described by:** BM/JK **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530457 mE **Northing:** 7460678 mN

**Habitat:** Southern slope of low rocky hill.

**Soil:** Brown clayey sand with possible sandstone/granite rocks.

**Rock Type:**

**Vegetation:** *Acacia arida* tall open shrubland over *Eremophila cuneifolia* and *Ptilotus obovatus* scattered shrubs over *Triodia wiseana* hummock grassland.

**Vegetation Code:** HBr4

**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** 5 - 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon dioicum</i>	+	0.3
<i>Acacia arida</i>	6	2.3
<i>Acacia atkinsiana</i>	+	1.4
<i>Acacia citrinoviridis</i>	+	2.5
<i>Acacia kempeana</i>	+	2
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	2.5
<i>Acacia tetragonophylla</i>	+	2.0
<i>Aristida contorta</i>	+	0.3
<i>Boerhavia coccinea</i>	+	decumb
<i>Bulbostylis barbata</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.3
<i>Cleome viscosa</i>	+	0.4
<i>Corchorus crozophorifolius</i>	+	0.3
<i>Corchorus laniflorus</i>	+	0.5
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.25
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon obtectus</i>	+	0.4
<i>Dysphania rhadinostachya</i> ?subsp.	+	0.2
<i>Enneapogon caeruleus</i>	+	0.35
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eremophila cuneifolia</i>	1	0.6
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>	+	1.8
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.2
<i>Euphorbia boophthona</i>	+	0.3
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.1
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Goodenia microptera</i>	+	0.3
<i>Heliotropium inexplicitum</i>	+	0.35
<i>Hibiscus coatesii</i>	+	0.4
<i>Indigofera monophylla</i>	+	0.2
<i>Iseilema eremaeum</i>	+	0.1
<i>Mollugo molluginea</i>	+	0.1
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.2

<i>Paraneurachne muelleri</i>	+	0.4
<i>Paspalidium clementii</i>	+	0.3
<i>Phyllanthus erwinii</i>	+	0.08
<i>Polycarpaea holtzei</i>	+	0.05
<i>Polycarpaea longiflora</i>	+	0.4
<i>Portulaca oleracea</i>	+	0.1
<i>Pterocaulon sphaeranthoides</i>	+	0.3
<i>Ptilotus aervoides</i>	+	0.05
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus calostachyus</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>	+	0.3
<i>Ptilotus obovatus</i>	+	0.7
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.35
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	1.0
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.5
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.8
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.8
<i>Sida echinocarpa</i>	+	0.3
<i>Sida</i> sp. <i>spiciform panicles</i> (E. Leyland s.n. 14/8/90)	+	0.3
<i>Solanum horridum</i>	+	0.4
<i>Solanum lasiophyllum</i>	+	0.2
<i>Sporobolus australasicus</i>	+	0.2
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.2
<i>Tribulus suberosus</i>	+	1
<i>Trichodesma zeylanicum</i> ?var.	+	0.3
<i>Triodia wiseana</i>	45	0.3
<i>Triumfetta clementii</i>	+	0.3

**API Resource Area****Site 1RA40**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 20/04/2009 **Described by:** JA **Seasonal Conditions:** E

**2nd Observation: Date:** 8/05/2011 **Described by:** BV/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529488 mE **Northing:** 7461436 mN

**Habitat:** Southeast edge on top of rocky high hill.

**Soil:** Red-brown sandy clay with ironstone pebbles.

**Rock Type:** Ironstone.

**Vegetation:** *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Acacia pruinocarpa* open shrubland over *A. spondylophylla* open heath over *Triodia wiseana* hummock grassland.

**Vegetation Code:** Hi19

**Vegetation Desc:** *Eucalyptus leucophloia* subsp. *leucophloia* and *Acacia pruinocarpa* scattered low trees to low open woodland over *A. marramamba* and *A. spondylophylla* scattered shrubs to open heath over *Triodia wiseana* hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** > 7 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia kempeana</i>		1.8
<i>Acacia maitlandii</i>	+	2.0
<i>Acacia marramamba</i>	+	1.5
<i>Acacia pruinocarpa</i>	+	2.0
<i>Acacia spondylophylla</i>		0.5
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	0.4
<i>Cymbopogon ambiguus</i>	+	0.5
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.15
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eremophila latrobei</i> subsp. <i>glabra</i>	+	0.6
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	20	4
<i>Gomphrena kanisii</i>		0.2
<i>Maireana melanocoma</i>	+	0.2
<i>Mollugo molluginea</i>	+	0.1
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paraneurachne muelleri</i>	+	0.3
<i>Paspalidium clementii</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus clementii</i>	+	0.4
<i>Ptilotus fusiformis</i>		
<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>	+	0.15
<i>Ptilotus obovatus</i>	+	0.8
<i>Scaevola acacioides</i>		1.0
<i>Senna artemisioides</i> subsp. <i>helmsii</i>		0.6
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.0
<i>Solanum ashbyae</i>	+	0.4
<i>Solanum gabrielae</i>	+	
<i>Trachymene</i> sp.		0.5
<i>Tribulus suberosus</i>	+	1.1

<i>Trichodesma zeylanicum</i> ?var.	+	0.6
<i>Triodia wiseana</i>	70	0.4

## API Resource Area

Site 1RA45

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 21/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 13/06/2011 **Described by:** NC/NK **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531773 mE **Northing:** 7460770 mN

**Habitat:** Southeast facing slope in narrow valley. Slope has scattered small rock piles.

**Soil:** Red loam with stony matrix.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia arida* tall open shrubland over *Trachymene pilbarensis*, *Cleome viscosa*, *Ptilotus auriculifolius* and *Polycarpaea longiflora* very open herbland with *Triodia wiseana* hummock grassland.

**Vegetation Code:** HBr4

**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.

**Veg Condition:** Good (some grazing by cattle) (2009). Excellent (2011).

**Fire Age:** > 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Abutilon lepidum</i>	+	0.15
<i>Acacia arida</i>	10	2.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	1.3
<i>Acacia tetragonophylla</i>	+	2
<i>Amaranthus cuspidifolius</i>	+	0.45
<i>Aristida contorta</i>	+	0.3
<i>Boerhavia coccinea</i>	+	0.2
<i>Cleome viscosa</i>	1	0.65
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.15
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1.2
<i>Dysphania rhadinostachya</i> ?subsp.	+	0.10
<i>Enneapogon lindleyanus</i>	+	0.3
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Eremophila cuneifolia</i>	+	1.6
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.1
<i>Hibiscus coatesii</i>	+	0.25
<i>Hybanthus aurantiacus</i>	+	0.3
<i>Iseilema dolichotrichum</i>	+	0.06
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.15
<i>Polycarpaea longiflora</i>	1	0.3
<i>Portulaca oleracea</i>	+	0.05
<i>Pterocaulon sphaeranthoides</i>	+	0.1
<i>Ptilotus auriculifolius</i>	2	0.55
<i>Ptilotus obovatus</i>	+	0.8
<i>Rhynchosia minima</i>	+	climber
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.1
<i>Sida</i> sp. <i>spiciform</i> panicles (E. Leyland s.n. 14/8/90)	+	0.3
<i>Solanum horridum</i>	+	0.2
<i>Sporobolus australasicus</i>	+	0.2



<i>Swainsona maccullochiana</i>	+	0.5
<i>Trachymene pilbarensis</i>	1	0.5
<i>Tribulus hirsutus</i>	+	prostrate
<i>Trichodesma zeylanicum</i> ?var.	+	0.55
<i>Triodia wiseana</i>	50	0.5
<i>Triumfetta clementii</i>	+	0.25

**API Resource Area****Site 1RA46**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 21/04/2009 **Described by:** BV **Seasonal Conditions:** E

**2nd Observation: Date:** 5/04/2011 **Described by:** BM/AB **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529859 mE **Northing:** 7460181 mN

**Habitat:** Drainage channel running north-south and flood banks.

**Soil:** Red loam with alluvial sands and gravel in flood banks.

**Rock Type:** Mixed - translocated from catchment.

**Vegetation:** *Acacia aptaneura* and *A. citrinoviridis* low open forest over mixed spp. shrubland over *Triodia wiseana* open hummock grassland.

**Vegetation Code:** Mi08

**Vegetation Desc:** *Acacia citrinoviridis*, *A. aptaneura* low woodland to low open forest over *Triodia wiseana* scattered hummock grasses to hummock grassland and \**Cenchrus ciliaris* scattered tussock grasses to tussock grassland.

**Veg Condition:**

**Fire Age:** 5 - 10 years.

**Notes:**

**Species List**

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	0.4
<i>Acacia aptaneura</i>	4	7.50
<i>Acacia citrinoviridis</i>	25	5.0
<i>Acacia pruinocarpa</i>		7.0
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	2
<i>Acacia synchronicia</i>	+	1.5
<i>Acacia tetragonophylla</i>	+	1.8
<i>Acetosa vesicaria</i>		0.2
<i>Aerva javanica</i>	+	0.6
<i>Amaranthus cuspidifolius</i>	+	0.4
<i>Aristida contorta</i>	+	0.3
<i>Bidens bipinnata</i>	+	0.15
<i>Boerhavia coccinea</i>	+	prostrate
<i>Cenchrus ciliaris</i>	8	0.4
<i>Cenchrus setiger</i>	1	1
<i>Cleome viscosa</i>	+	0.4
<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	0.2
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.25
<i>Corchorus tridens</i>	+	prostrate
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.3
<i>Cucumis maderaspatanus</i>	+	climber
<i>Duperreya commixta</i>	+	0.2
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.3
<i>Enneapogon lindleyanus</i>	+	0.25
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Eremophila cuneifolia</i>		1.8
<i>Eremophila forrestii</i> ?subsp.	+	1.5
<i>Eremophila longifolia</i>	+	2
<i>Eriachne mucronata</i> (typical form)	+	0.4
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	+	0.15

<i>Euphorbia schultzii</i>	+	0.4
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.2
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.3
<i>Gomphrena cunninghamii</i>	+	0.25
<i>Goodenia microptera</i>	+	0.08
<i>Goodenia muelleriana</i>	+	0.25
<i>Goodenia tenuiloba</i>	+	0.1
<i>Gossypium australe</i> ( <i>Whim Creek form</i> )	+	0.5
<i>Grevillea berryana</i>	+	2
<i>Hibiscus sturtii</i> var. <i>platyklamys</i>	+	0.25
<i>Hybanthus aurantiacus</i>	+	0.3
<i>Indigofera colutea</i>	+	0.06
<i>Indigofera monophylla</i>	+	0.5
<i>Melaleuca lasiandra</i>	+	0.3
<i>Melhaniania oblongifolia</i>	+	0.2
<i>Mollugo molluginea</i>	+	0.2
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	+	0.15
<i>Phyllanthus maderaspatensis</i>	+	0.3
<i>Polycarpaea corymbosa</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.25
<i>Portulaca oleracea</i>	+	prostrate
<i>Pterocaulon sphaeranthoides</i>	+	0.15
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus calostachyus</i>	+	0.3
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.2
<i>Ptilotus obovatus</i>	+	0.6
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.4
<i>Rhagodia eremaea</i>	1	1.2
<i>Rhynchosia minima</i>	+	climber
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.4
<i>Santalum lanceolatum</i>	+	1.6
<i>Sclerolaena densiflora</i>	+	0.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.4
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	+	1.6
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	2
<i>Sida echinocarpa</i>	+	0.2
<i>Solanum ashbyae</i>	+	0.4
<i>Sporobolus australasicus</i>	+	0.3
<i>Stemodia grossa</i>	+	0.05
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.2
<i>Trachymene pilbarensis</i>	+	0.5
<i>Tribulus suberosus</i>	+	0.5
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	3	0.4
<i>Triumfetta clementii</i>	+	0.4

**API Resource Area****Site 1RAr10****Location:** Hardey Resource Area.**Type:** Quadrat 50 x 50 m**1st Observation: Date:** 17/04/2009 **Described by:** JA**Seasonal Conditions:** E**2nd Observation: Date:** 8/05/2011 **Described by:** BV/MS**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 530163 mE**Northing:** 7461754 mN**Habitat:** North side of rocky hill.**Soil:** Dark brown sandy clay.**Rock Type:** Ironstone and possibly sandstone.**Vegetation:** *Stylobasium spathulatum* and *Acacia pruinocarpa* scattered shrubs over *Triodia wiseana* hummock grassland.**Vegetation Code:** Hi03**Vegetation Desc:** *Triodia wiseana* (*T. angusta*) hummock grassland with *Senna* spp., *Stylobasium spathulatum*, *Acacia synchronicia* scattered shrubs to open shrubland.**Veg Condition:** Excellent (2009). Fair (2011).**Fire Age:** > 7 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia marramamba</i>	+	1.5
<i>Acacia pruinocarpa</i>	1	1.5
<i>Acacia synchronicia</i>	+	1.5
<i>Cenchrus ciliaris</i>	+	0.3
<i>Cleome viscosa</i>	+	0.2
<i>Cucumis maderaspatanus</i>	+	climber
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.5
<i>Enneapogon caeruleus</i>	+	0.2
<i>Eremophila longifolia</i>	+	1.5
<i>Grevillea berryana</i>	+	0.6
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.25
<i>Ptilotus clementii</i>	+	1
<i>Ptilotus obovatus</i>	+	0.5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.6
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.0
<i>Solanum lasiophyllum</i>	+	0.4
<i>Stylobasium spathulatum</i>	1	1.0
<i>Tribulus suberosus</i>	2	0.8
<i>Triodia angusta</i>	+	0.4
<i>Triodia wiseana</i>	50	0.3

<b>API Resource Area</b>		<b>Site</b>	<b>2RA01</b>
<b>Location:</b>	Hardey Resource Area.		<b>Type:</b> Quadrat 50 x 50 m
<b>1st Observation:</b>	<b>Date:</b> 27/08/2010	<b>Described by:</b> BVNK	<b>Seasonal Conditions:</b> P
<b>2nd Observation:</b>	<b>Date:</b> 6/04/2011	<b>Described by:</b> JATDI	<b>Seasonal Conditions:</b> E
<b>MGA Zone:</b>	50	<b>Easting:</b> 534715 mE	<b>Northing:</b> 7461539 mN
<b>Habitat:</b>	Flat plain in between minor and major drainage lines surrounded by low hills.		
<b>Soil:</b>	Red-brown fine clayey loam with rocky mantle.		
<b>Rock Type:</b>	Ironstone and quartz pebbles and small rocks.		
<b>Vegetation:</b>	<i>Acacia xiphophylla</i> low open woodland over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i> and <i>Eremophila cuneifolia</i> open shrubland over <i>Sporobolus australasicus</i> scattered tussock grasses.		
<b>Vegetation Code:</b>	PI10		
<b>Vegetation Desc:</b>	<i>Acacia xiphophylla</i> ( <i>A. tetragonophylla</i> and/ or <i>A. synchronicia</i> ) low open woodland to low woodland over <i>Senna</i> spp., <i>Eremophila cuneifolia</i> scattered shrubs over <i>Triodia wiseana</i> scattered hummock grasses.		
<b>Veg Condition:</b>	Good (2010). Excellent (2011).		
<b>Fire Age:</b>	> 10 years.		
<b>Notes:</b>	Incised major drainage line to east of plot, minor drainage line to the west of plot, hills to the north.		

### Species List

Name	% Cover	Height
<i>Acacia aptaneura</i>	+	3.0
<i>Acacia synchronicia</i>	+	2.0
<i>Acacia tetragonophylla</i>	+	2.0
<i>Acacia xiphophylla</i>	3	4.0
<i>Aristida contorta</i>	+	0.15
<i>Boerhavia gardneri</i>	+	0.1
<i>Brachyachne prostrata</i>	+	0.05
<i>Calandrinia schistorhiza</i>	+	0.05
<i>Cenchrus ciliaris</i>	+	0.4
<i>Dactyloctenium radulans</i>	+	0.1
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.4
<i>Enneapogon caerulescens</i>	+	0.15
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eremophila cuneifolia</i>	1	1.1
<i>Eriachne pulchella</i> ?subsp.	+	0.1
<i>Iseilema membranaceum</i>	+	0.05
<i>Maireana melanocoma</i>	+	0.3
<i>Polycarpaea corymbosa</i>	+	0.1
<i>Ptilotus aevroides</i>	+	0.05
<i>Ptilotus auriculifolius</i>	+	0.1
<i>Ptilotus obovatus</i>	+	0.4
<i>Sclerolaena densiflora</i>	+	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	3	1.2
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	1.1
<i>Senna stricta</i>	8	1.6
<i>Sporobolus australasicus</i>	+	0.15
<i>Tragus australianus</i>	+	0.1
<i>Triodia</i> ? <i>wiseana</i>	+	0.5
<i>Tripogon loliiformis</i>	+	0.1

**API Resource Area****Site 2RA02**

**Location:** Hardey Resource Area. 200 m east of road. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 27/08/2010 **Described by:** BMLK **Seasonal Conditions:** P

**2nd Observation: Date:** 6/04/2011 **Described by:** BM/AB **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 535321 mE **Northing:** 7463605 mN

**Habitat:** Broad drainage line and floodplain.

**Soil:** Pale red brown clay loam.

**Rock Type:** Small pebbles.

**Vegetation:** *Acacia citrinoviridis* and *Acacia kempeana* low woodland over *\*Cenchrus ciliaris* (*\*C. setiger*) tussock grassland.

**Vegetation Code:** mDr32

**Vegetation Desc:** *Acacia synchronicia*, *A. citrinoviridis* open shrubland to shrubland over *\*Cenchrus ciliaris* tussock grassland.

**Veg Condition:** Very poor (2010). Poor -Fair (2011).

**Fire Age:** >5 years.

**Notes:** Hills to north west of plot.  
Lots of dead trees and shrubs. Very degraded, heavily grazed, few things still alive in 2010.

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia citrinoviridis</i>	20	8.0
<i>Acacia kempeana</i>	5	6.0
<i>Acacia synchronicia</i>	+	2.0
<i>Aristida contorta</i>	+	0.1
<i>Boerhavia coccinea</i>	+	prostrate
<i>Cenchrus ciliaris</i>	40	0.3
<i>Cenchrus setiger</i>	1.5	0.4
<i>Cleome viscosa</i>	+	0.4
<i>Corchorus crozophorifolius</i>	+	0.5
<i>Corchorus tridens</i>	+	prostrate
<i>Cucumis maderaspatanus</i>	+	climber
<i>Duperreya commixta</i>	+	0.3
<i>Eremophila cuneifolia</i>	+	1.0
<i>Eriachne mucronata</i> (typical form)	+	0.4
<i>Euphorbia australis</i>	+	0.05
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.3
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.15
<i>Gossypium australe</i>	+	0.4
<i>Hybanthus aurantiacus</i>	+	0.3
<i>Mollugo molluginea</i>	+	0.1
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.3
<i>Polycarpaea longiflora</i>	+	0.35
<i>Portulaca oleracea</i>	+	0.1
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus obovatus</i>	+	0.5
<i>Rhagodia eremaea</i>	+	1.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.4
<i>Senna notabilis</i>	+	0.2
<i>Sporobolus australasicus</i>	+	0.4
<i>Triodia wiseana</i>	+	0.5

**API Resource Area****Site 2RA05**

**Location:** Hardey Resource Area. **Type:** Quadrat 25 x 100 m

**1st Observation: Date:** 27/08/2010 **Described by:** BVNK **Seasonal Conditions:** P

**2nd Observation: Date:** 6/04/2011 **Described by:** JA **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 534204 mE **Northing:** 7460832 mN

**Habitat:** Major creek bed and bank.

**Soil:** In channel - alluvially deposited rocks, stones and gravels. Bank - orange-brown loam.

**Rock Type:** Alluvially deposited rocks, stones and gravel.

**Vegetation:** *Eucalyptus camaldulensis* subsp. *obtusa* woodland over *Melaleuca glomerata* (*A. citrinoviridis*) low open forest over \**Cenchrus setiger* and \**C. ciliaris* tussock grassland.

**Vegetation Code:** Ma01

**Vegetation Desc:** *Eucalyptus camaldulensis* subsp. *obtusa*, *E. victrix* open woodland to woodland over *Melaleuca glomerata* tall open shrubland over \**Cenchrus ciliaris* very open tussock grassland to tussock grassland.

**Veg Condition:** Fair (2011)

**Fire Age:** > 10 years.

**Notes:**

**Species List**

Name	% Cover	Height
<i>Acacia citrinoviridis</i>	1	4.0
<i>Acacia coriacea</i> subsp. <i>pendens</i>	+	8.0
<i>Acacia synchronicia</i>	+	4.0
<i>Acetosa vesicaria</i>	+	0.1
<i>Aerva javanica</i>	+	0.1
<i>Alternanthera nana</i>	+	0.3
<i>Amaranthus undulatus</i>	+	1.0
<i>Ammannia multiflora</i>	+	0.4
<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	+	0.5
<i>Bergia</i> sp.	+	0.1
<i>Boerhavia repleta</i>	+	0.1
<i>Cenchrus ciliaris</i>	10	1.0
<i>Cenchrus setiger</i>	30	1.0
<i>Centipeda minima</i> subsp. <i>macrocephala</i>	+	0.15
<i>Citrullus colocynthis</i>	+	climber
<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>	+	climber
<i>Corchorus tridens</i>	+	0.1
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cucumis melo</i> subsp. <i>agrestis</i>	+	climber
<i>Cyperus vaginatus</i>	+	0.5
<i>Duperreya commixta</i>	+	climber
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eragrostis tenellula</i>	+	0.1
<i>Eriachne pulchella</i> ?subsp.	+	0.1
<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	10	18
<i>Eucalyptus victrix</i>	15	15.0
<i>Euphorbia biconvexa</i>	+	0.2
<i>Euphorbia hirta</i>	+	0.1
<i>Ipomoea muelleri</i>	+	climber
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.0
<i>Malvastrum americanum</i>	+	0.1
<i>Melaleuca glomerata</i>	30	6.0

<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Petalostylis labicheoides</i>	+	1.0
<i>Pluchea rubelliflora</i>	+	0.15
<i>Pluchea</i> sp.	+	0.15
<i>Plumbago zeylanica</i>	+	1.0
<i>Pterocaulon sphaeranthoides</i>	+	0.1
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.1
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)	+	0.15
<i>Sisymbrium orientale</i>	+	0.3
<i>Sonchus oleraceus</i>	+	0.4
<i>Sporobolus australasicus</i>	+	0.1
<i>Stemodia grossa</i>	+	0.2
<i>Vachellia farnesiana</i>	+	1.0



## API Resource Area

Site 2RA07

**Location:** Hardey Resource Area. Plot north of Nanutarra-Paraburdoo Rd. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 27/08/2010 **Described by:** BVNK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 6/05/2011 **Described by:** JATD **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 533585 mE **Northing:** 7460742 mN

**Habitat:** Southerly sloping hill.

**Soil:** Red-brown clayey loam with rocky mantle and small outcrops.

**Rock Type:** Ironstone rocks.

**Vegetation:** *Acacia arida* (*Senna artemisioides* subsp. *oligophylla*) open shrubland over *Triodia wiseana* hummock grassland.

**Vegetation Code:** HBr4

**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Abutilon lepidum</i>	+	0.15
<i>Acacia arida</i>	5	1.8
<i>Acacia tetragonophylla</i>	+	1.6
<i>Acetosa vesicaria</i>	+	0.2
<i>Aerva javanica</i>	+	0.4
<i>Amaranthus cuspidifolius</i>	+	0.2
<i>Aristida contorta</i>	+	0.2
<i>Boerhavia gardneri</i>	+	0.1
<i>Bulbostylis barbata</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.4
<i>Cleome viscosa</i>	+	0.3
<i>Corchorus crozophorifolius</i>	+	0.4
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.3
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.3
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1.0
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.15
<i>Eremophila cuneifolia</i>	+	1.0
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.4
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.1
<i>Gomphrena cunninghamii</i>	+	0.05
<i>Goodenia microptera</i>	+	0.3
<i>Goodenia muelleriana</i>	+	0.2
<i>Hybanthus aurantiacus</i>	+	0.2
<i>Iseilema membranaceum</i>	+	0.1
<i>Mollugo molluginea</i>	+	0.1
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.1
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.15
<i>Portulaca oleracea</i>	+	0.1
<i>Ptilotus auriculifolius</i>	+	0.3

<i>Ptilotus clementii</i>	+	0.1
<i>Ptilotus obovatus</i>	+	0.65
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	0.5
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	0.8
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	0.5
<i>Sida</i> sp. <i>spiciform panicles</i> (E. Leyland s.n. 14/8/90)	+	0.1
<i>Sporobolus australasicus</i>	+	0.15
<i>Swainsona maccullochiana</i>	+	0.05
<i>Trachymene</i> sp.	+	0.2
<i>Tribulus suberosus</i>	+	0.75
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	50	0.6
<i>Triumfetta clementii</i>	+	0.2

**API Resource Area****Site 2RA08****Location:** Hardey Resource Area. 400m north of Nanutarra-Paraburdoo Rd.**Type:** Quadrat 50 x 50 m**1st Observation:** **Date:** 27/08/2010 **Described by:** BMLK**Seasonal Conditions:** P**2nd Observation:** **Date:** 6/04/2011 **Described by:** AB**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 535634 mE**Northing:** 7462730 mN**Habitat:** Northeast facing slope of hill.**Soil:** Skeletal red-brown clay loam.**Rock Type:** Pebbles (stony surface).**Vegetation:** *Acacia arida* tall open shrubland over *Triodia wiseana* hummock grassland.**Vegetation Code:** HBr4**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.**Veg Condition:** Excellent.**Fire Age:** >7 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon lepidum</i>	+	0.3
<i>Acacia arida</i>	4	3.2
<i>Acacia synchronicia</i>	+	2.1
<i>Aerva javanica</i>	+	0.35
<i>Aristida contorta</i>	+	0.2
<i>Bidens bipinnata</i>	+	0.4
<i>Boerhavia coccinea</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.25
<i>Cleome viscosa</i>	+	0.4
<i>Corchorus crozophorifolius</i>	+	0.15
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.4
<i>Corchorus tridens</i>	+	0.3
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dactyloctenium radulans</i>	+	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.06
<i>Enneapogon caeruleus</i>	+	0.2
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila cuneifolia</i>	+	1.2
<i>Euphorbia schultzei</i>	+	0.15
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.2
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Goodenia microptera</i>	+	0.06
<i>Goodenia muelleriana</i>	+	0.2
<i>Iseilema eremaeum</i>	+	0.05
<i>Mollugo molluginea</i>	+	0.2
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.25
<i>Portulaca oleracea</i>	+	prostrate
<i>Pterocaulon sphaeranthoides</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.6
<i>Ptilotus clementii</i>	+	0.4
<i>Ptilotus fusiformis</i>	+	0.4

<i>Rhynchosia minima</i>	+	climber
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.4
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	2.0
<i>Senna notabilis</i>	+	0.2
<i>Sida echinocarpa</i>	+	0.1
<i>Solanum gabrielae</i>	+	0.4
<i>Sporobolus australasicus</i>	+	0.25
<i>Swainsona decurrens</i>	+	0.15
<i>Trachymene pilbarensis</i>	+	
<i>Trianthema triquetra</i>	+	0.15
<i>Tribulus suberosus</i>	+	1.2
<i>Trichodesma zeylanicum</i> ?var.	+	0.2
<i>Triodia wiseana</i>	50	0.4
<i>Triumfetta clementii</i>	+	0.2

**API Resource Area****Site 2RA10****Location:** Hardey Resource Area. Plot south-east of drainage line and hills. **Type:** Quadrat 50 x 50 m**1st Observation:** **Date:** 28/08/2010 **Described by:** BMNK **Seasonal Conditions:** P**2nd Observation:** **Date:** 9/05/2011 **Described by:** BV/MS **Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 532995 mE **Northing:** 7461601 mN**Habitat:** Moderately steep north-westerly sloping hill.**Soil:** Alluvial red-brown clayey loam with rocky mantle.**Rock Type:** Ironstone rocks and outcrops.**Vegetation:** *Acacia arida* open shrubland over *Triodia wiseana* (*T. angusta*) hummock grassland.**Vegetation Code:** HBr4**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.**Veg Condition:** Excellent.**Fire Age:** 5 - 10 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon lepidum</i>	+	0.4
<i>Acacia arida</i>	15	1.5
<i>Acacia tetragonophylla</i>	+	1.5
<i>Amaranthus cuspidifolius</i>	+	0.3
<i>Bonamia media</i> var. <i>villosa</i>	+	0.05
<i>Cleome viscosa</i>	+	0.5
<i>Corchorus crozophorifolius</i>	+	0.1
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.3
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	
<i>Cymbopogon</i> sp.	+	0.5
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Enneapogon caerulescens</i>	+	0.25
<i>Enneapogon polyphyllus</i>	+	0.2
<i>Eremophila cuneifolia</i>	+	0.6
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.5
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.3
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.5
<i>Gomphrena cunninghamii</i>	+	0.4
<i>Gomphrena kanisii</i>	+	0.15
<i>Hibiscus coatesii</i>	+	0.3
<i>Hybanthus aurantiacus</i>	+	0.15
<i>Iseilema membranaceum</i>	+	0.1
<i>Mollugo molluginea</i>	+	0.2
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.25
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	+	0.2
<i>Polycarpaea longiflora</i>	+	0.4
<i>Pterocaulon sphaeranthoides</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus fusiformis</i>	+	0.4
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.3
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.0
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	2.0

<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	2.5
<i>Senna notabilis</i>	+	0.4
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)	+	0.1
<i>Solanum ellipticum</i>	+	0.3
<i>Tephrosia densa</i>	+	0.3
<i>Trachymene</i> sp.	+	0.3
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia</i> ? <i>angusta</i>	1	0.4
<i>Triodia wiseana</i>	70	0.7
<i>Triumfetta clementii</i>	+	0.5

## API Resource Area

Site 2RA11

**Location:** Hardey resource Area. Plot in creek bed north-east of road. **Type:** Quadrat 25 x 100 m

**1st Observation:** **Date:** 28/08/2010 **Described by:** BVLK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 6/04/2011 **Described by:** BM/AB **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 532872 mE **Northing:** 7461087 mN

**Habitat:** Minor creekline.

**Soil:** Stony skeletal soil.

**Rock Type:** Mixed riverbed rocks.

**Vegetation:** *Acacia citrinoviridis* low woodland over *Triodia wiseana* very open hummock grassland with \**Cenchrus ciliaris* (\**C. setiger*) tussock grassland.

**Vegetation Code:** Mi06

**Vegetation Desc:** *Acacia citrinoviridis* low open woodland to low open forest over \**Cenchrus ciliaris* open tussock grassland to tussock grassland and *Triodia wiseana* scattered hummocks.

**Veg Condition:** Good (2010). Fair (2011).

**Fire Age:** > 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia aptaneura</i>	+	3.5
<i>Acacia arida</i>	+	3.5
<i>Acacia citrinoviridis</i>	20	7.0
<i>Acacia coriacea</i> subsp. <i>pendens</i>	+	2.2
<i>Acacia kempeana</i>	+	5.0
<i>Acacia pruinocarpa</i>	+	2.0
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	2.0
<i>Acacia tetragonophylla</i>	external	1.5
<i>Aerva javanica</i>	+	0.5
<i>Boerhavia coccinea</i>	+	prostrate
<i>Bonamia media</i> var. <i>villosa</i>	+	0.5
<i>Cenchrus ciliaris</i>	35	0.35
<i>Cenchrus setiger</i>	2	0.4
<i>Citrullus colocynthis</i>	+	0.4
<i>Cleome viscosa</i>	+	0.3
<i>Corchorus crozophorifolius</i>	+	0.3
<i>Corchorus tridens</i>	+	0.3
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	climber
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Eriachne</i> sp.	+	0.4
<i>Euphorbia australis</i>	+	0.05
<i>Euphorbia biconvexa</i>	+	0.25
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Grevillea berryana</i>	+	1.8
<i>Hybanthus aurantiacus</i>	+	0.3
<i>Mollugo molluginea</i>	+	0.1
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.3

<i>Ptilotus obovatus</i>	+	0.3
<i>Rhagodia eremaea</i>	+	0.5
<i>Rhynchosia minima</i>	+	climber
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.8
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.2
<i>Solanum sturtianum</i>	+	0.4
<i>Sporobolus australasicus</i>	+	0.08
<i>Trachymene</i> sp.	+	0.1
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	2.5	0.3
<i>Triumfetta clementii</i>	+	0.3



## API Resource Area

Site 2RA12

**Location:** Hardey resource Area. Plot 300 m east of track. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 29/08/2010 **Described by:** BMNK **Seasonal Conditions:** P

**2nd Observation: Date:** 24/05/2011 **Described by:** JATD **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 530417 mE **Northing:** 7463175 mN

**Habitat:** Westerly facing moderate slope and hill breakaway.

**Soil:** Skeletal brown loam.

**Rock Type:** Quartzite and ironstone breakaway with surface rock.

**Vegetation:** *Acacia arida* and *A. bivenosa* scattered shrubs over *Triodia wiseana* hummock grassland.

**Vegetation Code:** HBr4

**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	0.3
<i>Acacia arida</i>	1	1.3
<i>Acacia bivenosa</i>	1	1.7
<i>Acacia kempeana</i>	+	0.8
<i>Acacia pruinocarpa</i>	+	1.5
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	5.0
<i>Acacia synchronicia</i>	+	0.6
<i>Acacia tetragonophylla</i>	+	1.0
<i>Amaranthus cuspidifolius</i>	+	0.4
<i>Aristida contorta</i>	+	0.2
<i>Cleome viscosa</i>	+	0.5
<i>Cymbopogon ambiguus</i>	+	1.0
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Eremophila cuneifolia</i>	+	0.4
<i>Eremophila longifolia</i>	+	1.2
<i>Euphorbia australis</i>	+	0.15
<i>Gomphrena cunninghamii</i>	+	0.15
<i>Gossypium australe</i> (Whim Creek form)	+	0.8
<i>Hybanthus aurantiacus</i>	+	0.15
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.7
<i>Nicotiana occidentalis</i> ?subsp.	+	0.3
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.3
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.4
<i>Ptilotus obovatus</i>	+	0.5
<i>Scaevola acacioides</i>	+	0.5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	0.35
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.3
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.2
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	1.0
<i>Solanum gabrielae</i>	+	0.5
<i>Sporobolus australasicus</i>	+	0.3
<i>Themeda triandra</i>	+	0.3
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.5

<i>Tribulus suberosus</i>	+	0.8
<i>Triodia wiseana</i>	45	0.4
<i>Triumfetta clementii</i>	+	0.2

**API Resource Area****Site 2RA13****Location:** Hardey Resource Area. Plot situated between two creeklines.**Type:** Quadrat 50 x 50 m**1st Observation:** Date: 29/08/2010**Described by:** BVLK**Seasonal Conditions:** P**2nd Observation:** Date: 10/05/2011**Described by:** JA/MS**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 532137 mE**Northing:** 7462132 mN**Habitat:** Stony top of low rise.**Soil:** Skeletal red loam.**Rock Type:** Ironstone, very rocky.**Vegetation:** *Acacia synchronicia* tall open shrubland over *Senna* spp. and *Acacia arida* open shrubland over *Triodia wiseana* hummock grassland.**Vegetation Code:** HBr4**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.**Veg Condition:** Excellent.**Fire Age:** > 10 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia aptaneura</i>	+	4.0
<i>Acacia arida</i>	1	1.8
<i>Acacia bivenosa</i>	+	3.5
<i>Acacia synchronicia</i>	4	3.2
<i>Acacia tetragonophylla</i>	+	2.0
<i>Acacia xiphophylla</i>	+	6.0
<i>Aerva javanica</i>	+	0.2
<i>Boerhavia gardneri</i>	+	
<i>Bonamia media</i> var. <i>villosa</i>	+	0.4
<i>Cleome viscosa</i>	+	0.2
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.4
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.2
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.4
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.3
<i>Enneapogon lindleyanus</i>	+	0.2
<i>Eremophila cuneifolia</i>	+	1.0
<i>Eremophila longifolia</i>	+	1.0
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.2
<i>Flaveria trinervia</i>	+	0.3
<i>Gomphrena canescens</i> subsp. <i>canescens</i>	+	0.1
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Hibiscus coatesii</i>	+	+2RA13-06
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	+	0.1
<i>Phyllanthus erwinii</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.3
<i>Pterocaulon sphaeranthoides</i>	+	0.2
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.15
<i>Ptilotus obovatus</i>	+	0.4
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.9

<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.8
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	0.6
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.4
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.5
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	1	1.4
<i>Senna stricta</i>	+	1.0
<i>Sporobolus australasicus</i>	+	0.2
<i>Stemodia grossa</i>	+	0.3
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.2
<i>Trachymene pilbarensis</i>	+	0.2
<i>Tribulus suberosus</i>	+	0.9
<i>Trichodesma zeylanicum</i> ?var.	+	0.3
<i>Triodia wiseana</i>	50	0.6
<i>Triumfetta clementii</i>	+	0.2

## API Resource Area

Site 2RA17

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 29/08/2010 **Described by:** BVLK **Seasonal Conditions:** P

**2nd Observation: Date:** 13/06/2011 **Described by:** JATD **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531759 mE **Northing:** 7462673 mN

**Habitat:** Hilltop.

**Soil:** Skeletal, orange-brown loam.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia pyrifolia* var. *pyrifolia* scattered tall shrubs over *A. arida*, *Senna glutinosa* subsp. *glutinosa* and *S. glutinosa* subsp. *pruinosa* scattered shrubs over *Triodia wiseana* hummock grassland.

**Vegetation Code:** HBr4**Vegetation Desc:** *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.**Veg Condition:** Excellent.**Fire Age:** > 10 years.**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia arida</i>	+	1.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	4.0
<i>Aristida contorta</i>	+	0.2
<i>Boerhavia coccinea</i>	+	0.15
<i>Bulbostylis barbata</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.3
<i>Cleome viscosa</i>	+	0.3
<i>Corchorus laniflorus</i>	+	0.2
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.2
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.1
<i>Enneapogon polyphyllus</i>	+	0.3
<i>Enneapogon robustissimus</i>	+	0.3
<i>Eremophila cuneifolia</i>	+	0.6
<i>Eremophila fraseri</i> ?subsp.	+	0.4
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.15
<i>Euphorbia australis</i>	+	0.05
<i>Gomphrena cunninghamii</i>	+	0.15
<i>Heliotropium inexplicitum</i>	+	0.05
<i>Hibiscus coatesii</i>	+	0.1
<i>Indigofera monophylla</i>	+	0.2
<i>Iseilema eremaeum</i>	+	0.05
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.15
<i>Oldenlandia crouchiana</i>	+	0.05
<i>Paspalidium clementii</i>	+	0.1
<i>Polycarpaea corymbosa</i>	+	0.1
<i>Polycarpaea longiflora</i>	+	0.2
<i>Polygala isingii</i>	+	0.05
<i>Portulaca</i> sp.	+	0.02
<i>Ptilotus auriculifolius</i>	+	0.4
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.3
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.6
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.0
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.3

<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.50
<i>Sporobolus australasicus</i>	+	0.2
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.1
<i>Tribulus hirsutus</i>	+	0.1
<i>Tribulus suberosus</i>	+	1.0
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	40	0.4
<i>Tripogon loliiformis</i>	+	0.1

**API Resource Area****Site 2RA18**

**Location:** Hardey Resource Area. **Type:** Quadrat 12.5 x 200 m

**1st Observation: Date:** 29/08/2010 **Described by:** BMNK **Seasonal Conditions:** P

**2nd Observation: Date:** 11/05/2011 **Described by:** BV/DW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531660 mE **Northing:** 7462881 mN

**Habitat:** Major creekline between hills.

**Soil:** Pale brown sand.

**Rock Type:** Small to large boulders.

**Vegetation:** *Acacia citrinoviridis*, *A. coriacea* subsp. *pendens* and *Melaleuca glomerata* low open forest over *Stemodia grossa* very open herbland with *Triodia wiseana* very open hummock grassland.

**Vegetation Code:** Mi02

**Vegetation Desc:** *Acacia citrinoviridis*, *A. coriacea* subsp. *pendens* (*Melaleuca glomerata*) low open forest over *Triodia wiseana* very open hummock grassland and mixed spp. scattered tussock grasses.

**Veg Condition:** Excellent (2010). Good (2011).

**Fire Age:** 5 - 10 years.

**Notes:** Plot is 400 m north of track.

**Species List**

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	1.2
<i>Acacia citrinoviridis</i>	30	8.0
<i>Acacia coriacea</i> subsp. <i>pendens</i>	7	8.0
<i>Acacia maitlandii</i>	+	1.8
<i>Acacia tetragonophylla</i>	+	2.0
<i>Aerva javanica</i>	+	0.8
<i>Amaranthus undulatus</i>	+	1.0
<i>Bidens bipinnata</i>	+	0.4
<i>Boerhavia coccinea</i>	+	0.1
<i>Cenchrus ciliaris</i>	+	0.3
<i>Cleome viscosa</i>	+	0.5
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>	+	0.8
<i>Convolvulus clementii</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	0.8
<i>Corchorus</i> sp.	+	0.5
<i>Corchorus tridens</i>	+	0.1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.4
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1.2
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.3
<i>Enneapogon lindleyanus</i>	+	0.3
<i>Enneapogon polyphyllus</i>	+	0.5
<i>Eremophila longifolia</i>	+	1.5
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.5
<i>Euphorbia alsiniflora</i>	+	0.3
<i>Euphorbia schultzii</i>	+	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.6
<i>Flaveria trinervia</i>	+	1.0
<i>Gomphrena cunninghamii</i>	+	0.4

<i>Hybanthus aurantiacus</i>	+	0.3
<i>Indigofera monophylla</i>	+	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.5
<i>Melaleuca glomerata</i>	10	4.0
<i>Mollugo molluginea</i>	+	0.25
<i>Nicotiana occidentalis</i> ?subsp.	+	0.6
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.4
<i>Oldenlandia crouchiana</i>	+	0.2
<i>Paspalidium clementii</i>	+	0.4
<i>Peripleura arida</i>	+	0.3
<i>Pluchea rubelliflora</i>	+	0.4
<i>Pluchea</i> sp.	+	0.4
<i>Polycarpaea longiflora</i>	+	0.4
<i>Pterocaulon sphaeranthoides</i>	+	0.5
<i>Ptilotus auriculifolius</i>	+	0.5
<i>Rhynchosia minima</i>	+	climber
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	1.0
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.0
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	0.8
<i>Setaria verticillata</i>	+	1.0
<i>Stemodia grossa</i>	5	0.2
<i>Tephrosia densa</i>	+	0.1
<i>Tephrosia rosea</i> var. <i>glabrior</i>	+	0.5
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	1.0
<i>Trichodesma zeylanicum</i> ?var.	+	0.5
<i>Triodia wiseana</i>	10	0.6
<i>Triumfetta clementii</i>	+	0.4



**API Resource Area****Site 2RA19**

**Location:** Sheet 4 of 4 - Hardey resource area. **Type:** Quadrat 50 x 50 m

**1st Observation:** **Date:** 30/08/2010 **Described by:** BVLK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 10/05/2011 **Described by:** JA/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 532461 mE **Northing:** 7463144 mN

**Habitat:** Rocky outcrop on high hill.

**Soil:** Skeletal red loam.

**Rock Type:** Granite outcrop, rocky pebbly around.

**Vegetation:** *Eremophila longifolia* and *Acacia tetragonophylla* scattered shrubs over *Triodia wiseana* open hummock grassland with *Cymbopogon ambiguus* scattered tussock grasses with mixed spp. very open herbland.

**Vegetation Code:** Hi04

**Vegetation Desc:** *Acacia* spp. and *Eremophila* spp. open shrubland over *Triodia wiseana* (*T. angusta*) open hummock grassland and *Cymbopogon ambiguus* scattered tussock grasses.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:** Rock outcrop in centre of plot.

**Species List**

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	0.4
<i>Acacia arida</i>	+	1.4
<i>Acacia bivenosa</i>	+	1.2
<i>Acacia coriacea</i> subsp. <i>pendens</i>	+	2.5
<i>Acacia pruinocarpa</i>	external	1.0
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	3.0
<i>Acacia tetragonophylla</i>	+	1.5
<i>Amaranthus mitchellii</i>	+	0.5
<i>Bidens bipinnata</i>	+	0.5
<i>Boerhavia gardneri</i>	+	0.2
<i>Capparis spinosa</i> var. <i>nummularia</i>	+	0.1
<i>Cheilanthes lasiophylla</i>	+	0.3
<i>Cleome viscosa</i>	+	0.4
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>	+	5.0
<i>Corchorus crozophorifolius</i>	+	1.0
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.3
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	1	1.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.2
<i>Enneapogon caeruleus</i>	+	0.1
<i>Eremophila longifolia</i>	1	3.0
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.04
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.2
<i>Gomphrena cunninghamii</i>	+	0.2
<i>Hakea chordophylla</i>	+	1.2
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.1
<i>Lepidium oxytrichum</i>	+	0.02
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.4
<i>Nicotiana occidentalis</i> subsp. <i>obliqua</i>	+	0.05

<i>Nicotiana umbratica</i>	+	0.2
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.2
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.3
<i>Pterocaulon sphaeranthoides</i>	+	0.15
<i>Ptilotus auriculifolius</i>	+	0.5
<i>Rhynchosia minima</i>	+	0.2
<i>Santalum lanceolatum</i>	+	1.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.0
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	0.8
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.0
<i>Solanum horridum</i>	+	0.05
<i>Sporobolus australasicus</i>	+	0.3
<i>Swainsona maccullochiana</i>	+	0.2
<i>Tephrosia densa</i>	+	0.4
<i>Tephrosia rosea</i> var. <i>rosea</i>	+	0.3
<i>Themeda triandra</i>	+	0.7
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.4
<i>Trachymene pilbarensis</i>	+	1.0
<i>Tribulus suberosus</i>	+	1.0
<i>Trichodesma zeylanicum</i> ?var.	+	0.6
<i>Triodia wiseana</i>	20	0.4
<i>Triumfetta clementii</i>	+	0.4

**API Resource Area****Site 2RA22**

**Location:** Hardey Resource Area. **Type:** Quadrat 50 x 50 m

**1st Observation: Date:** 30/08/2010 **Described by:** BMNK **Seasonal Conditions:** P

**2nd Observation: Date:** 24/05/2011 **Described by:** BVCW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 533362 mE **Northing:** 7462411 mN

**Habitat:** Crest of hill as well as north and south facing slopes.

**Soil:** Red-brown clayey loam with very rocky mantle.

**Rock Type:** Ironstone rocks and pebbles.

**Vegetation:** *Senna glutinosa* subsp. *pruinosa* (*Acacia arida*) scattered tall shrubs over *Eremophila platycalyx* subsp. *pardalota* open shrubland over *Triodia wiseana* hummock grassland.

**Vegetation Code:** Hi04

**Vegetation Desc:** *Acacia* spp. and *Eremophila* spp. open shrubland over *Triodia wiseana* (*T. angusta*) open hummock grassland and *Cymbopogon ambiguus* scattered tussock grasses.

**Veg Condition:** Excellent (2010). Excellent (2011).

**Fire Age:** 5 - 10 years.

**Notes:** *Acacia arida* minimal in quadrat but present on most surrounding hillslopes in slightly higher proportions.

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Abutilon dioicum</i>	+	0.25
<i>Acacia arida</i>	+	1.8
<i>Acacia pruinocarpa</i>	+	0.4
<i>Acacia synchronicia</i>	+	1.2
<i>Acacia tetragonophylla</i>	+	2.1
<i>Amaranthus cuspidifolius</i>	+	0.25
<i>Boerhavia coccinea</i>	+	0.1
<i>Cleome viscosa</i>	+	0.4
<i>Corchorus crozophorifolius</i>	+	1.3
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.4
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.2
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.3
<i>Dysphania</i> sp.	+	0.5
<i>Enneapogon lindleyanus</i>	+	0.3
<i>Enneapogon polyphyllus</i>	+	0.4
<i>Eremophila cuneifolia</i>	+	1.5
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>	+	1.8
<i>Euphorbia boophthona</i>	+	0.2
<i>Gomphrena cunninghamii</i>	+	0.4
<i>Gomphrena kanisii</i>	+	0.25
<i>Goodenia muelleriana</i>	+	0.4
<i>Gossypium australe</i>	+	0.6
<i>Heliotropium inexplicitum</i>	+	0.08
<i>Hibiscus coatesii</i>	+	0.5
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.25
<i>Oldenlandia crouchiana</i>	+	0.1
<i>Paspalidium clementii</i>	+	0.3
<i>Peripleura arida</i>	+	0.2
<i>Polycarpaea longiflora</i>	+	0.3
<i>Pterocaulon sphaeranthoides</i>	+	0.4

<i>Ptilotus auriculifolius</i>	+	0.3
<i>Ptilotus axillaris</i>	+	0.3
<i>Ptilotus calostachyus</i>	+	0.5
<i>Ptilotus fusiformis</i>	+	0.2
<i>Ptilotus obovatus</i>	+	0.5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.4
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.2
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1	2.0
<i>Senna stricta</i>	+	1.5
<i>Sida</i> sp. <i>spiciform</i> panicles (E. Leyland s.n. 14/8/90)	+	0.15
<i>Streptoglossa decurrens</i>	+	0.1
<i>Swainsona maccullochiana</i>	+	0.4
<i>Tephrosia supina</i>	+	0.05
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.6
<i>Tribulus hirsutus</i>	+	0.05
<i>Tribulus suberosus</i>	+	0.8
<i>Trichodesma zeylanicum</i> ?var.	+	0.4
<i>Triodia wiseana</i>	60	0.6
<i>Triumfetta clementii</i>	+	0.3

**API Resource Area****Site****2RAr03**

**Location:** Hardey Resource Area, north of Nanutarra-Paraburdoo Road. **Type:** Relevé

**1st Observation:** **Date:** 27/08/2010 **Described by:** BVNK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 6/04/2011 **Described by:** JATDI **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 534651 mE **Northing:** 7461372 mN

**Habitat:** Minor incised drainage channel draining low hill range.

**Soil:** Sandy loam.

**Rock Type:** Alluvially deposited rocks and stones of mixed lithography.

**Vegetation:** *Acacia citrinoviridis* (*A. aptaneura*) low open forest over \**Cenchrus ciliaris* (*Eriachne mucronata* (typical form)) very open tussock grassland with *Triodia wiseana* very open hummock grassland.

**Vegetation Code:** Mi08

**Vegetation Desc:** *Acacia citrinoviridis*, *A. aptaneura* low woodland to low open forest over *Triodia wiseana* scattered hummock grasses to hummock grassland and \**Cenchrus ciliaris* scattered tussock grasses to tussock grassland.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:**

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia aptaneura</i>	2	8.0
<i>Acacia citrinoviridis</i>	30	8.00
<i>Acacia kempeana</i>	+	5.00
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	1.5
<i>Acacia tetragonophylla</i>	+	3.00
<i>Acetosa vesicaria</i>	+	0.15
<i>Amaranthus cuspidifolius</i>	+	0.30
<i>Boerhavia gardneri</i>	+	0.10
<i>Bonamia media</i> var. <i>villosa</i>	+	0.05
<i>Cenchrus ciliaris</i>	10	0.50
<i>Cenchrus setiger</i>	+	0.40
<i>Cleome viscosa</i>	+	0.30
<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	
<i>Corchorus tridens</i>	+	0.10
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.15
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1.2
<i>Dicladantha forrestii</i>	+	0.40
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.10
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eriachne mucronata</i> (typical form)	1	0.40
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.10
<i>Flaveria trinervia</i>	+	0.15
<i>Goodenia tenuiloba</i>	+	0.10
<i>Hybanthus aurantiacus</i>	+	0.30
<i>Indigofera monophylla</i>	+	0.80
<i>Melhania oblongifolia</i>	+	0.15
<i>Mollugo molluginea</i>	+	0.15
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.20

<i>Oldenlandia crouchiana</i>	+	0.10
<i>Phyllanthus erwinii</i>	+	0.30
<i>Polycarpaea corymbosa</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.30
<i>Portulaca oleracea</i>	+	0.05
<i>Pterocaulon sphaeranthoides</i>	+	0.10
<i>Ptilotus auriculifolius</i>	+	0.20
<i>Rhynchosia minima</i>	+	0.05
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.50
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.00
<i>Solanum sturtianum</i>	+	0.20
<i>Sporobolus australasicus</i>	+	0.20
<i>Stemodia grossa</i>	+	0.10
<i>Tephrosia densa</i>	+	0.20
<i>Themeda triandra</i>	+	0.80
<i>Trachymene</i> sp.	+	0.20
<i>Trichodesma zeylanicum</i> ?var.	+	0.30
<i>Triodia wiseana</i>	2	0.40
<i>Triumfetta clementii</i>	+	0.30

**API Resource Area****Site 2RAr04**

**Location:** Hardey Resource Area. **Type:** Relevé

**1st Observation: Date:** 27/08/2010 **Described by:** BMLK **Seasonal Conditions:** P

**2nd Observation: Date:** 6/04/2011 **Described by:** BM/AB **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 535712 mE **Northing:** 7463659 mN

**Habitat:** Broad floodplain.

**Soil:** Brown clay loam.

**Rock Type:** N/A.

**Vegetation:** *Acacia citrinoviridis* scattered low trees over *A. synchronicia* scattered tall shrubs over \**Cenchrus ciliaris* open tussock grassland.

**Vegetation Code:** mDr32

**Vegetation Desc:** *Acacia synchronicia*, *A. citrinoviridis* open shrubland to shrubland over \**Cenchrus ciliaris* tussock grassland.

**Veg Condition:** Very poor - heavily grazed (2010). Fair (2011).

**Fire Age:** 5 - 10 years.

**Notes:**

**Species List**

Name	% Cover	Height
<i>Acacia aptaneura</i>	+	5.0
<i>Acacia citrinoviridis</i>	2	1.80
<i>Acacia inaequilatera</i>	+	2.50
<i>Acacia kempeana</i>	+	3.00
<i>Acacia pruinocarpa</i>	+	5.00
<i>Acacia synchronicia</i>	2	3.50
<i>Acacia tetragonophylla</i>	+	2.20
<i>Boerhavia coccinea</i>	+	0.20
<i>Cenchrus ciliaris</i>	25	0.30
<i>Cenchrus setiger</i>	+	0.40
<i>Citrullus colocynthis</i>	+	prostrate
<i>Dysphania sp.</i>	+	0.10
<i>Eragrostis xerophila</i>	+	0.20
<i>Eremophila cuneifolia</i>	+	0.40
<i>Goodenia forrestii</i>	+	0.50
<i>Grevillea berryana</i>	+	3.50
<i>Hakea lorea subsp. lorea</i>	+	5.0
<i>Notoleptopus decaisnei var. orbicularis</i>	+	0.20
<i>Petalostylis labicheoides</i>	+	2.50
<i>Polycarpaea longiflora</i>	+	0.20
<i>Portulaca oleracea</i>	+	0.10
<i>Ptilotus obovatus</i>	+	0.50
<i>Senna artemisioides subsp. oligophylla (thinly sericeous)</i>	+	0.30
<i>Sporobolus australasicus</i>	+	0.30
<i>Triumfetta clementii</i>	+	0.3
<i>Vachellia farnesiana</i>	+	0.60

## API Resource Area

Site 2RAr06

Location: Hardey Resource Area.

Type: Relevé

1st Observation: Date: 27/08/2010

Described by: BMLK

Seasonal Conditions: P

2nd Observation: Date: 6/04/2011

Described by: BM/AB

Seasonal Conditions: E

MGA Zone: 50 Easting: 534893 mE

Northing: 7463310 mN

Habitat: Hilltops and upper slopes.

Soil: Skeletal orange soils.

Rock Type:

Vegetation: *Acacia arida* scattered tall shrubs over *Triodia wiseana* hummock grassland.

Vegetation Code: HBr4

Vegetation Desc: *Acacia arida* open heath over *Triodia wiseana* open hummock grassland to hummock grassland.

Veg Condition: Excellent.

Fire Age: &gt; 10 years.

Notes:

## Species List

Name	% Cover	Height
<i>Abutilon lepidum</i> (4)	+	0.20
<i>Acacia arida</i>	1.5	2.20
<i>Acacia pruinocarpa</i>	+	3.0
<i>Acacia tetragonophylla</i>	+	0.50
<i>Amaranthus cuspidifolius</i>	+	0.40
<i>Aristida contorta</i>	+	0.30
<i>Boerhavia coccinea</i>	+	prostrate
<i>Bulbostylis barbata</i>	+	0.20
<i>Cenchrus ciliaris</i>	+	0.20
<i>Cleome viscosa</i>	+	0.60
<i>Corchorus crozophorifolius</i>	+	0.20
<i>Corchorus laniflorus</i>	+	0.30
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.40
<i>Enneapogon polyphyllus</i>	+	0.20
<i>Eremophila cuneifolia</i>	+	0.60
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	+	0.10
<i>Euphorbia schultzei</i>	+	0.15
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.30
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.20
<i>Gomphrena cunninghamii</i>	+	0.25
<i>Heliotropium inexplicitum</i>	+	0.20
<i>Iseilema eremaeum</i>	+	0.10
<i>Mollugo molluginea</i>	+	0.15
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.25
<i>Oldenlandia crouchiana</i>	+	0.10
<i>Paspalidium clementii</i>	+	0.20
<i>Polycarpha longiflora</i>	+	0.40
<i>Ptilotus auriculifolius</i>	+	0.50
<i>Ptilotus clementii</i>	+	0.30
<i>Ptilotus fusiformis</i>	+	0.50
<i>Ptilotus obovatus</i>	+	0.30
<i>Ptilotus villosiflorus</i>	+	0.30
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.80
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.10



<i>Sporobolus australasicus</i>	+	0.20
<i>Swainsona maccullochiana</i>	+	0.25
<i>Tephrosia densa</i>	+	0.30
<i>Trachymene pilbarensis</i>	+	0.40
<i>Tribulus suberosus</i>	+	0.30
<i>Trichodesma zeylanicum</i> ?var.	+	0.30
<i>Triodia wiseana</i>	40	0.40
<i>Triumfetta clementii</i>	+	0.40

## API Resource Area

Site 2RAr09

**Location:** Hardey Resource Area. **Type:** Relevé

**1st Observation:** **Date:** 27/08/2010 **Described by:** BVNK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 7/04/2011 **Described by:** JAAB **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 533020 mE **Northing:** 7460490 mN

**Habitat:** Flood plain with incised channels.

**Soil:**

**Rock Type:** Alluvial deposited mixed rocks and stones.

**Vegetation:** *Acacia citrinoviridis* low woodland over *Petalostylis labicheoides* and *Acacia pyrifolia* var. *pyrifolia* tall open shrubland over \**Cenchrus ciliaris* and \**C. setiger* open tussock grassland.

**Vegetation Code:** Ma03

**Vegetation Desc:** (*Eucalyptus victrix* and/ or *Eucalyptus leucophloia* subsp. *leucophloia*), *Acacia citrinoviridis* low open woodland over *Petalostylis labicheoides*, *Stylobasium spathulatum*, *A. bivenosa* tall shrubland over *Triodia angusta*, *T. wiseana* very open hummock grassland and \**Cenchrus ciliaris* scattered tussock grasses.

**Veg Condition:** Good (2010). Fair - Poor (2011).

**Fire Age:** > 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia citrinoviridis</i>	25	7.00
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2	2.50
<i>Acacia tetragonophylla</i>	+	3.00
<i>Acetosa vesicaria</i>	+	0.15
<i>Aerva javanica</i>	1	0.40
<i>Boerhavia</i> sp.	+	0.10
<i>Cenchrus ciliaris</i>	20	0.45
<i>Cenchrus setiger</i>	10	0.40
<i>Citrullus colocynthis</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	0.80
<i>Cucumis maderaspatanus</i>	+	climber
<i>Duperreya commixta</i>	+	climber
<i>Dysphania</i> sp.	+	0.10
<i>Eriachne pulchella</i> ?subsp.	+	0.10
<i>Euphorbia hirta</i>	+	0.10
<i>Goodenia forrestii</i>	+	0.25
<i>Grevillea berryana</i>	+	7.00
<i>Hybanthus aurantiacus</i>	+	0.15
<i>Indigofera monophylla</i>	+	0.40
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	2.20
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.10
<i>Petalostylis labicheoides</i>	1	3.50
<i>Plumbago zeylanica</i>	+	0.50
<i>Polycarpaea longiflora</i>	+	0.20
<i>Pterocaulon sphaeranthoides</i>	+	0.05
<i>Ptilotus auriculifolius</i>	+	0.10
<i>Ptilotus obovatus</i>	+	0.40
<i>Rhagodia eremaea</i>	+	2.00
<i>Solanum sturtianum</i>	+	0.40
<i>Sporobolus australasicus</i>	+	0.15
<i>Triodia wiseana</i>	+	0.40

**API Resource Area****Site 2RAr14****Location:** Hardey Resource Area.**Type:** Relevé**1st Observation: Date:** 29/08/2010 **Described by:** BMNK**Seasonal Conditions:** P**2nd Observation: Date:** 11/05/2011 **Described by:** JA/MS**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 529824 mE **Northing:** 7463134 mN**Habitat:** Major creekline and banks between steeply sloping hills. Creek incised on one side.**Soil:** Brown sandy loam with very rocky mantle.**Rock Type:** Pebbles and rocks of various sizes.**Vegetation:** *Eucalyptus victrix* scattered low trees over *A. bivenosa*, *A. citrinoviridis*, *Petalostylis labicheoides* and *Stylobasium spathulatum* tall shrubland over *\*Cenchrus ciliaris* (*\*C. setiger*) open tussock grassland with *Triodia angusta* scattered hummock grasses.**Vegetation Code:** Ma03**Vegetation Desc:** (*Eucalyptus victrix* and/ or *Eucalyptus leucophloia* subsp. *leucophloia*), *Acacia citrinoviridis* low open woodland over *Petalostylis labicheoides*, *Stylobasium spathulatum*, *A. bivenosa* tall shrubland over *Triodia angusta*, *T. wiseana* very open hummock grassland and *\*Cenchrus ciliaris* scattered tussock grasses.**Veg Condition:** Very good (2010). Good - Excellent (2011).**Fire Age:** > 10 years.**Notes:****Species List**

Name	% Cover	Height
<i>Acacia bivenosa</i>	10	5.00
<i>Acacia citrinoviridis</i>	10	5.00
<i>Amaranthus mitchellii</i>	+	0.40
<i>Bidens bipinnata</i>	+	0.30
<i>Cenchrus ciliaris</i>	10	0.50
<i>Cenchrus setiger</i>	+	0.70
<i>Cleome viscosa</i>	+	0.40
<i>Convolvulus clementii</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	1.0
<i>Corchorus lasiocarpus</i> ?subsp.	+	0.50
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.10
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.80
<i>Duperreya commixta</i>	+	climber
<i>Eremophila longifolia</i>	+	4.00
<i>Eucalyptus victrix</i>	1	15.0
<i>Euphorbia australis</i>	+	0.30
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.20
<i>Flaveria trinervia</i>	+	0.10
<i>Indigofera monophylla</i>	+	0.30
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.10
<i>Melaleuca glomerata</i>	+	0.50
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.20
<i>Oldenlandia crouchiana</i>	+	0.10
<i>Paspalidium clementii</i>	+	0.10
<i>Petalostylis labicheoides</i>	1	4.00
<i>Phyllanthus maderaspatensis</i>	+	0.40
<i>Polycarpaea longiflora</i>	+	0.20
<i>Pterocaulon sphaeranthoides</i>	+	0.20
<i>Ptilotus auriculifolius</i>	+	0.40

<i>Ptilotus obovatus</i>	+	0.40
<i>Rhynchosia minima</i>	+	0.20
<i>Salsola tragus</i> subsp. <i>tragus</i>	+	0.20
<i>Scaevola acacioides</i>	+	0.50
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.80
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.40
<i>Senna notabilis</i>	+	0.20
<i>Stylobasium spathulatum</i>	3	3.50
<i>Tephrosia rosea</i> var. <i>glabrior</i>	+	0.40
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.20
<i>Trichodesma zeylanicum</i> ?var.	+	0.30
<i>Triodia angusta</i>	1	0.50
<i>Triodia wiseana</i>	+	0.40

**API Resource Area****Site 2RAr15**

**Location:** Hardey Resource Area **Type:** Relevé

**1st Observation: Date:** 29/08/2010 **Described by:** BVLK **Seasonal Conditions:** P

**2nd Observation: Date:** 10/05/2011 **Described by:** JA/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 532494 mE **Northing:** 7462654 mN

**Habitat:** Minor drainage channel between steep sided hills forming shallow gorge.

**Soil:** Light brown loam.

**Rock Type:**

**Vegetation:** *Melaleuca glomerata* low closed forest over *Streptoglossa decurrens* and *Pluchea rubelliflora* herbland with *Cyperus vaginata* scattered sedges with \**Setaria verticillata* scattered tussock grasses.

**Vegetation Code:** Ma04

**Vegetation Desc:** *Melaleuca glomerata* low closed forest over *Streptoglossa decurrens* and *Pluchea rubelliflora* herbland.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:** *Melaleuca glomerata* forms dense thickets with *Eremophila longifolia* around the periphery. Water present and lots of birds. Drainage area leading to calcrete-lined creek with rock pools.

**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia arida</i>	+	2.0
<i>Acacia bivenosa</i>	+	3.00
<i>Acacia citrinoviridis</i>	+	4.0
<i>Acacia coriacea</i> subsp. <i>pendens</i>	+	2.20
<i>Acacia pruinocarpa</i>	+	1.0
<i>Bidens bipinnata</i>	+	0.30
<i>Boerhavia coccinea</i>	+	0.20
<i>Cenchrus ciliaris</i>	+	0.50
<i>Citrullus colocynthis</i>	+	climber
<i>Cleome viscosa</i>	+	0.40
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>	+	0.50
<i>Convolvulus clementii</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	1.10
<i>Corchorus tridens</i>	+	0.10
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.20
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1.00
<i>Cyperus vaginatus</i>	+	0.60
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.20
<i>Eragrostis tenellula</i>	+	0.20
<i>Eremophila longifolia</i>	+	3.00
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	+	14.00
<i>Euphorbia australis</i>	+	0.30
<i>Glycine canescens</i>	+	climber
<i>Gossypium australe</i> (Whim Creek form)	+	0.30
<i>Helichrysum luteoalbum</i>	+	0.20
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	climber
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.40
<i>Malvastrum americanum</i>	+	0.60
<i>Melaleuca glomerata</i>	90	4.00
<i>Melhanian oblongifolia</i>	+	0.50

<i>Nicotiana occidentalis</i> ?subsp.	1	0.40
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.20
<i>Oldenlandia crouchiana</i>	+	0.10
<i>Phyllanthus maderaspatensis</i>	+	0.30
<i>Pluchea rubelliflora</i>	15	0.40
<i>Polycarpaea longiflora</i>	+	0.30
<i>Pterocaulon sphaeranthoides</i>	+	0.20
<i>Rhynchosia minima</i>	+	0.20
<i>Santalum lanceolatum</i>	+	3.00
<i>Scaevola spinescens</i>	+	1.00
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	1.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.8
<i>Senna stricta</i>	+	1.10
<i>Setaria verticillata</i>	+	0.40
<i>Sonchus oleraceus</i>	+	0.50
<i>Streptoglossa decurrens</i>	20	0.30
<i>Stylobasium spathulatum</i>	+	1.10
<i>Swainsona maccullochiana</i>	+	0.40
<i>Tephrosia rosea</i> var. <i>glabrior</i>	+	0.40
<i>Trachymene pilbarensis</i>	+	0.40
<i>Trichodesma zeylanicum</i> ?var.	+	0.40
<i>Triodia wiseana</i>	+	0.8

## API Resource Area

Site 2RAr16

**Location:** Hardey Resource Area. **Type:** Relevé

**1st Observation:** **Date:** 29/08/2010 **Described by:** BMNK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 10/05/2011 **Described by:** BV/DW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531193 mE **Northing:** 7462655 mN

**Habitat:** Rocky breakaway (hill).

**Soil:** Skeletal soils.

**Rock Type:** Ironstone.

**Vegetation:** *Acacia aptaneura* scattered low trees over *Cymbopogon obtectus* scattered tussock grasses with *Triodia wiseana* scattered hummock grasses.

**Vegetation Code:** Hi04

**Vegetation Desc:** *Acacia* spp. and *Eremophila* spp. open shrubland over *Triodia wiseana* (*T. angusta*) open hummock grassland and *Cymbopogon ambiguus* scattered tussock grasses.

**Veg Condition:** Excellent.

**Fire Age:** > 5 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia aptaneura</i>	2	5.0
<i>Acacia arida</i>	+	2.00
<i>Acacia pruinocarpa</i>	+	1.80
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	+	0.4
<i>Amaranthus cuspidifolius</i>	+	0.30
<i>Bidens bipinnata</i>	+	0.60
<i>Boerhavia gardneri</i>	+	0.08
<i>Cheilanthes lasiophylla</i>	+	0.1
<i>Cleome viscosa</i>	+	0.50
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>	+	0.80
<i>Corchorus crozophorifolius</i>	+	0.70
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon obtectus</i>	1	0.50
<i>Enneapogon polyphyllus</i>	+	0.50
<i>Eremophila longifolia</i>	+	1.50
<i>Gomphrena cunninghamii</i>	+	0.30
<i>Hibiscus coatesii</i>	+	1.60
<i>Hibiscus haynaldii</i>	+	0.8
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.5
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.40
<i>Nicotiana benthamiana</i>	+	0.30
<i>Nicotiana umbratica</i>	+	0.50
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.40
<i>Oldenlandia crouchiana</i>	+	0.20
<i>Polycarpaea longiflora</i>	+	0.30
<i>Pterocaulon sphacelatum</i>	+	0.20
<i>Ptilotus obovatus</i>	+	0.50
<i>Rhagodia eremaea</i>	+	1.5
<i>Rhodanthe margarethae</i>	+	0.40
<i>Rhynchosia minima</i>	+	climber
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	0.50
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	2.00
<i>Sida</i> sp. <i>spiciform</i> panicles ( <i>E. Leyland</i> s.n. 14/8/90)	+	0.25

<i>Stemodia grossa</i>	+	0.60
<i>Swainsona maccullochiana</i>	+	0.40
<i>Trachymene pilbarensis</i>	+	0.30
<i>Tribulus suberosus</i>	+	1.0
<i>Trichodesma zeylanicum</i> ?var.	+	0.60
<i>Triodia wiseana</i>	1	0.60
<i>Triumfetta clementii</i>	+	0.60



**API Resource Area****Site 2RAr20**

**Location:** Hardey Resource Area. **Type:** Relevé

**1st Observation:** **Date:** 30/08/2010 **Described by:** BMNK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 9/05/2011 **Described by:** JADW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 532987 mE **Northing:** 7461885 mN

**Habitat:** Convergence of three minor drainage lines.

**Soil:** Brown sands.

**Rock Type:** Small to medium sized boulders. Geological combination.

**Vegetation:** *Acacia citrinoviridis* (*A. pruinocarpa*) tall open scrub over *Senna* spp. scattered shrubs over *Triodia wiseana* very open hummock grassland over mixed spp. open herbland.

**Vegetation Code:** Mi02

**Vegetation Desc:** *Acacia citrinoviridis*, *A. coriacea* subsp. *pendens* (*Melaleuca glomerata*) low open forest over *Triodia wiseana* very open hummock grassland and mixed spp. scattered tussock grasses.

**Veg Condition:** Excellent (2011).

**Fire Age:** >5 years.

**Notes:** Confluence of drainage lines between hills.  
Quite dense *Acacia synchronicia* on eastern slopes of hills.

**Species List**

Name	% Cover	Height
<i>Abutilon fraseri</i>	+	0.30
<i>Acacia bivenosa</i>	+	3.0
<i>Acacia citrinoviridis</i>	35	12.00
<i>Acacia coriacea</i> subsp. <i>pendens</i>	+	4.0
<i>Acacia pruinocarpa</i>	1	5.00
<i>Acacia pyrifolia</i> ?var.	+	4.00
<i>Acacia synchronicia</i>	+	3.00
<i>Aerva javanica</i>	+	0.50
<i>Amaranthus cuspidifolius</i>	+	0.20
<i>Boerhavia coccinea</i>	+	0.20
<i>Cleome viscosa</i>	+	0.40
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>	+	1.00
<i>Convolvulus clementii</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	1.40
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.40
<i>Corchorus tridens</i>	+	0.10
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.20
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1.0
<i>Duperreya commixta</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.20
<i>Enneapogon polyphyllus</i>	+	0.20
<i>Eremophila longifolia</i>	+	1.3
<i>Eriachne mucronata</i> (typical form)	+	0.40
<i>Euphorbia australis</i>	+	0.10
<i>Euphorbia biconvexa</i>	+	0.20
<i>Euphorbia schultzei</i>	+	0.15
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.60
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	+	0.20
<i>Flaveria trinervia</i>	+	0.15
<i>Glycine canescens</i>	+	climber

<i>Gomphrena cunninghamii</i>	+	0.20
<i>Gossypium australe</i> (Whim Creek form)	+	0.50
<i>Hybanthus aurantiacus</i>	+	0.20
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.00
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.30
<i>Malvastrum americanum</i>	+	0.30
<i>Nicotiana</i> sp.	+	0.20
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.30
<i>Oldenlandia crouchiana</i>	+	0.20
<i>Paspalidium clementii</i>	+	0.15
<i>Peripleura arida</i>	+	0.30
<i>Petalostylis labicheoides</i>	+	1.10
<i>Phyllanthus maderaspatensis</i>	+	0.30
<i>Polycarpaea longiflora</i>	+	0.40
<i>Pterocaulon sphaeranthoides</i>	+	0.20
<i>Ptilotus auriculifolius</i>	+	0.30
<i>Ptilotus obovatus</i>	+	0.70
<i>Rhynchosia minima</i>	+	0.20
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	+	1.00
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	+	1.00
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	2.20
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	2.20
<i>Sporobolus australasicus</i>	+	0.15
<i>Streptoglossa decurrens</i>	+	0.50
<i>Swainsona maccullochiana</i>	+	0.20
<i>Tephrosia rosea</i> var. <i>glabrior</i>	+	0.30
<i>Themeda triandra</i>	+	0.80
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.20
<i>Trachymene pilbarensis</i>	+	0.40
<i>Trichodesma zeylanicum</i> ?var.	+	0.40
<i>Triodia wiseana</i>	3	0.50
<i>Triumfetta clementii</i>	+	0.30

## API Resource Area

Site 2RAr21

**Location:** Hardey Resource Area. **Type:** Relevé

**1st Observation:** **Date:** 30/08/2010 **Described by:** BVLK **Seasonal Conditions:** P

**2nd Observation:** **Date:** 12/05/2011 **Described by:** BV/DW **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 531511 mE **Northing:** 7463185 mN

**Habitat:** Minor drainage channel through steep sided hills.

**Soil:** Skeletal soils.

**Rock Type:** Mixed rocks and stones of alluvial deposition.

**Vegetation:** *Acacia citrinoviridis* (A. *aptaneura*) low woodland over *Eremophila cryptothrix* and *Senna artemisioides* subsp. *oligophylla* scattered shrubs over *Triodia wiseana* scattered hummock grasses.

**Vegetation Code:** Mi02

**Vegetation Desc:** *Acacia citrinoviridis*, *A. coriacea* subsp. *pendens* (*Melaleuca glomerata*) low open forest over *Triodia wiseana* very open hummock grassland and mixed spp. scattered tussock grasses.

**Veg Condition:** Excellent (2010). Good (2011).

**Fire Age:** 5 - 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Abutilon dioicum</i>	+	1.00
<i>Acacia aptaneura</i>	5	4.00
<i>Acacia citrinoviridis</i>	15	4.00
<i>Acacia coriacea</i> subsp. <i>pendens</i>	+	3.0
<i>Acacia pyrifolia</i> ?var.	+	0.10
<i>Acacia tetragonophylla</i>	+	3.0
<i>Amaranthus cuspidifolius</i>	+	0.20
<i>Bidens bipinnata</i>	+	0.30
<i>Boerhavia coccinea</i>	+	0.10
<i>Bulbostylis barbata</i>	+	0.15
<i>Cleome viscosa</i>	+	0.40
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>	+	3.0
<i>Convolvulus clementii</i>	+	climber
<i>Corchorus crozophorifolius</i>	+	1.00
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	+	0.50
<i>Corchorus tridens</i>	+	0.10
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	+	0.30
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.8
<i>Duperreya commixta</i>	+	climber
<i>Dysphania</i> sp.	+	0.10
<i>Enneapogon lindleyanus</i>	+	0.15
<i>Enneapogon polyphyllus</i>	+	0.40
<i>Eremophila cryptothrix</i>	1	1.00
<i>Eremophila latrobei</i> ?subsp.	+	1.0
<i>Eriachne tenuiculmis</i>	+	0.40
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	+	0.10
<i>Gomphrena cunninghamii</i>	+	0.15
<i>Hybanthus aurantiacus</i>	+	0.10
<i>Indigofera monophylla</i>	+	0.10
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	climber
<i>Mollugo molluginea</i>	+	0.20
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	+	0.30

<i>Oldenlandia crouchiana</i>	+	0.20
<i>Paspalidium clementii</i>	+	0.30
<i>Pterocaulon sphaeranthoides</i>	+	0.10
<i>Rhynchosia minima</i>	+	climber
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	1.50
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>	+	0.80
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	+	1.1
<i>Tephrosia densa</i>	+	0.20
<i>Themeda triandra</i>	+	0.80
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	1.00
<i>Trichodesma zeylanicum</i> ?var.	+	0.50
<i>Triodia wiseana</i>	2	0.60
<i>Triumfetta clementii</i>	+	0.50

**API Resource Area****Site 3RAr01****Location:** Hardey Resource Area.**Type:** Relevé**1st Observation: Date:** 21/10/2010 **Described by:** BM/JA**Seasonal Conditions:** P**2nd Observation: Date:** 10/05/2011 **Described by:** BV/DW**Seasonal Conditions:** E**MGA Zone:** 50 **Easting:** 530434 mE **Northing:** 7462127 mN**Habitat:** Southwest facing mid-slopes, below breakaways.**Soil:** Brown loam.**Rock Type:** Iron exposed rock.**Vegetation:** *Acacia synchronicia* scattered shrubs over *Triodia wiseana* hummock grassland.**Vegetation Code:** Hi03**Vegetation Desc:** *Triodia wiseana* (*T. angusta*) hummock grassland with *Senna* spp., *Stylobasium spathulatum*, *Acacia synchronicia* scattered shrubs to open shrubland.**Veg Condition:** Excellent (2010). Fair (2011).**Fire Age:** > 5 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia aptaneura</i>	+	1.60
<i>Acacia arida</i>	+	0.50
<i>Acacia pruinocarpa</i>	+	2.00
<i>Acacia synchronicia</i>	1	1.20
<i>Cleome viscosa</i>	+	0.80
<i>Maireana georgei</i>	+	0.40
<i>Paspalidium clementii</i>	+	0.30
<i>Polycarpaea longiflora</i>	+	0.30
<i>Ptilotus auriculifolius</i>	+	0.40
<i>Ptilotus fusiformis</i>	+	0.40
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.00
<i>Solanum ashbyae</i>	+	0.40
<i>Stylobasium spathulatum</i>	+	1.50
<i>Tribulus suberosus</i>	+	0.40
<i>Triodia wiseana</i>	60	0.60

## API Resource Area

Site 3RAr02

**Location:** Hardey Resource Area. **Type:** Relevé

**1st Observation: Date:** 21/10/2010 **Described by:** BM/JA **Seasonal Conditions:** P

**2nd Observation: Date:** 11/05/2011 **Described by:** JA/MS **Seasonal Conditions:** E

**MGA Zone:** 50 **Easting:** 529716 mE **Northing:** 7462446 mN

**Habitat:** Rocky slopes of gorge facing southwest.

**Soil:** Very shallow red-brown clayey loam.

**Rock Type:** Dales Gorge Formation.

**Vegetation:** *Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia ferritcola* scattered low trees over *Dodonaea pachyneura* and *Eremophila latrobei* subsp. *latrobei* open shrubland over *Triodia wiseana* hummock grassland.

**Vegetation Code:** Hi22

**Vegetation Desc:** *Eucalyptus leucophloia* subsp. *leucophloia* and/ or *Corymbia ferritcola* scattered low trees over *Dodonaea pachyneura*, *Eremophila latrobei* subsp. *latrobei* scattered shrubs to open shrubland over *Triodia wiseana* scattered hummock grasses to open hummock grassland and *Eriachne mucronata* scattered tussock grasses.

**Veg Condition:** Excellent.

**Fire Age:** > 10 years.

**Notes:**

## Species List

Name	% Cover	Height
<i>Acacia bivenosa</i>	+	3.00
<i>Acacia citrinoviridis</i>	+	1.50
<i>Acacia hamersleyensis</i>	+	2.50
<i>Acacia maitlandii</i>	+	4.00
<i>Acacia marramamba</i>	+	1.50
<i>Acacia pruinocarpa</i>	1	2.00
<i>Amaranthus mitchellii</i>	+	0.40
<i>Amaranthus undulatus</i>	+	0.20
<i>Bulbostylis barbata</i>	+	0.20
<i>Capparis spinosa</i> var. <i>nummularia</i>	+	0.40
<i>Cleome viscosa</i>	+	0.50
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>	+	2.50
<i>Corymbia ferritcola</i>	+	5.00
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	1.00
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	+	0.20
<i>Dodonaea pachyneura</i>	1	2.00
<i>Duperreya commixta</i>	+	climber
<i>Enneapogon polyphyllus</i>	+	0.20
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	1	1.00
<i>Eremophila longifolia</i>	+	0.30
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.30
<i>Eriachne mucronata</i> (typical form)	+	0.40
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	1	12.00
<i>Gomphrena cunninghamii</i>	+	0.20
<i>Hibiscus coatesii</i>	+	0.30
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	1.00
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	+	0.30
<i>Nicotiana benthamiana</i>	+	0.20
<i>Oldenlandia crouchiana</i>	+	0.15

<i>Paspalidium clementii</i>	+	0.20
<i>Phyllanthus maderaspatensis</i>	+	0.40
<i>Polycarpaea longiflora</i>	+	0.30
<i>Pterocaulon sphaeranthoides</i>	+	0.10
<i>Ptilotus auriculifolius</i>	+	0.40
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.20
<i>Ptilotus fusiformis</i>	+	0.40
<i>Scaevola acacioides</i>	+	0.80
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.80
<i>Solanum ellipticum</i>	+	0.40
<i>Solanum gabrielae</i>	+	0.40
<i>Solanum</i> sp.	+	0.80
<i>Stemodia grossa</i>	+	0.10
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.50
<i>Trachymene pilbarensis</i>	+	0.50
<i>Trichodesma zeylanicum</i> ?var.	+	0.30
<i>Triodia wiseana</i>	40	0.40
<i>Triodia wiseana</i>	+	0.50
<i>Triumfetta clementii</i>	+	0.50

## API Resource Area

Site 3RAr03

Location: Hardey Resource Area.

Type: Relevé

1st Observation: Date: 21/10/2010 Described by: BM/JA

Seasonal Conditions: P

2nd Observation: Date: 11/05/2011 Described by: JA/MS

Seasonal Conditions: E

MGA Zone: 50 Easting: 529542 mE

Northing: 7462371 mN

Habitat: Hill tops.

Soil: Skeletal brown loam.

Rock Type: Rocky ironstone.

Vegetation: *Eucalyptus leucophloia* subsp. *leucophloia* scattered low shrubs over *Acacia pruinocarpa* and *A. marramamba* tall open shrubland over *Triodia wiseana* hummock grassland.

Vegetation Code: Hi19

Vegetation Desc: *Eucalyptus leucophloia* subsp. *leucophloia* and *Acacia pruinocarpa* scattered low trees to low open woodland over *A. marramamba* and *A. spondylophylla* scattered shrubs to open heath over *Triodia wiseana* hummock grassland.

Veg Condition: Excellent.

Fire Age: &gt; 10 years.

Notes:

## Species List

Name	% Cover	Height
<i>Acacia kempeana</i>	+	2.00
<i>Acacia maitlandii</i>	+	2.50
<i>Acacia marramamba</i>	4	2.20
<i>Acacia pruinocarpa</i>	4	3.00
<i>Acacia spondylophylla</i>	2	0.50
<i>Cleome viscosa</i>	+	0.40
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.20
<i>Eriachne mucronata</i>	+	0.15
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.20
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.20
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	1	6.50
<i>Gomphrena cunninghamii</i>	+	0.15
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	climber
<i>Oldenlandia crouchiana</i>	+	0.15
<i>Paspalidium clementii</i>	+	0.15
<i>Ptilotus auriculifolius</i>	+	0.40
<i>Ptilotus clementii</i>	+	0.40
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.20
<i>Ptilotus fusiformis</i>	+	0.40
<i>Ptilotus obovatus</i>	+	0.50
<i>Scaevola acacioides</i>	+	1.00
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	+	0.40
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	+	1.60
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	+	1.50
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	+	1.00
<i>Solanum gabrielae</i>	+	0.50
<i>Sporobolus australasicus</i>	+	0.20
<i>Stylobasium spathulatum</i>	+	1.40
<i>Tribulus suberosus</i>	+	0.70
<i>Trichodesma zeylanicum</i> ?var.	+	0.40
<i>Triodia wiseana</i>	45	0.40



## API Resource Area

Site 3RAr04

Location: Hardey Resource Area.

Type: Relevé

1st Observation: Date: 21/10/2010 Described by: BM/JA

Seasonal Conditions: P

2nd Observation: Date: 8/05/2011 Described by: JADW

Seasonal Conditions: E

MGA Zone: 50 Easting: 529763 mE

Northing: 7462086 mN

Habitat: Sheer rock faces.

Soil: N/A.

Rock Type: Ironstone.

Vegetation: *Corymbia ferritcola* scattered low trees over *Acacia pruinocarpa*, *A. rhodophloia* tall open shrubland over *Eriachne mucronata* scattered tussock grasses and *Triodia wiseana* scattered hummock grasses.

Vegetation Code: Hi22

Vegetation Desc: *Eucalyptus leucophloia* subsp. *leucophloia* and/ or *Corymbia ferritcola* scattered low trees over *Dodonaea pachyneura*, *Eremophila latrobei* subsp. *latrobei* scattered shrubs to open shrubland over *Triodia wiseana* scattered hummock grasses to open hummock grassland and *Eriachne mucronata* scattered tussock grasses.

Veg Condition: Excellent.

Fire Age: &gt; 10 years.

Notes:

## Species List

Name	% Cover	Height
<i>Acacia pruinocarpa</i>	2	2.50
<i>Acacia rhodophloia</i>	1	3.00
<i>Acacia tetragonophylla</i>	+	0.40
<i>Astrotricha hamptonii</i>	+	0.50
<i>Bulbostylis barbata</i>	+	0.20
<i>Cleome viscosa</i>	+	0.40
<i>Corymbia ferritcola</i>	2	3.00
<i>Cucumis maderaspatanus</i>	+	climber
<i>Cymbopogon ambiguus</i>	+	0.50
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>	+	0.20
<i>Dodonaea pachyneura</i>	+	0.30
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.15
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	+	1.20
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.30
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	+	0.10
<i>Ficus brachypoda</i>	+	1.50
<i>Gomphrena cunninghamii</i>	+	0.10
<i>Grevillea berryana</i>	+	3.00
<i>Nicotiana</i> sp.	+	0.20
<i>Paspalidium clementii</i>	+	0.20
<i>Polycarpaea corymbosa</i>	+	0.15
<i>Polycarpaea longiflora</i>	+	0.40
<i>Ptilotus auriculifolius</i>	+	0.50
<i>Sauropus crassifolius</i>	+	0.30
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	+	0.10
<i>Triodia wiseana</i>	1	0.40
<i>Triumfetta maconochieana</i>	+	0.30

**API Resource Area****Site** 6RAr01**Location:** Hardey Resource Area.**Type:** Relevé**1st Observation: Date:** 24/05/2011 **Described by:** JATD**Seasonal Conditions:** E**2nd Observation: Date:** **Described by:****Seasonal Conditions:****MGA Zone:** 50 **Easting:** 531400 mE**Northing:** 7461729 mN**Habitat:** Gently undulating stony plain.**Soil:** Red brown clay loam.**Rock Type:** Ironstone pebbles.**Vegetation:** *Acacia xiphophylla* and *A. synchronicia* tall shrubland over *Senna glutinosa* subsp. *x luerssenii* and *S. stricta* open shrubland over \**Cenchrus ciliaris* scattered tussock grasses.**Vegetation Code:** PI10**Vegetation Desc:** *Acacia xiphophylla* (*A. tetragonophylla* and/ or *A. synchronicia*) low open woodland to low woodland over *Senna* spp., *Eremophila cuneifolia* scattered shrubs over *Triodia wiseana* scattered hummock grasses.**Veg Condition:** Excellent.**Fire Age:** > 10 years.**Notes:****Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Acacia synchronicia</i>	2	0.40
<i>Acacia tetragonophylla</i>	+	2.00
<i>Acacia xiphophylla</i>	10	4.50
<i>Boerhavia coccinea</i>	+	0.10
<i>Brachyachne prostrata</i>	+	0.05
<i>Cenchrus ciliaris</i>	+	0.30
<i>Cleome viscosa</i>	+	0.30
<i>Corchorus crozophorifolius</i>	+	0.50
<i>Cucumis maderaspatanus</i>	+	climber
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	+	0.10
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	+	0.50
<i>Enneapogon polyphyllus</i>	+	0.15
<i>Eremophila cuneifolia</i>	+	1.30
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>	+	1.30
<i>Eriachne pulchella</i> ?subsp.	+	0.05
<i>Jasminum didymum</i> subsp. <i>lineare</i>	+	0.70
<i>Mollugo molluginea</i>	+	0.10
<i>Portulaca oleracea</i>	+	0.05
<i>Ptilotus auriculifolius</i>	+	0.15
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	+	0.10
<i>Ptilotus obovatus</i>	+	0.50
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	+	0.40
<i>Rhagodia eremaea</i>	+	1.10
<i>Sclerolaena densiflora</i>	+	0.10
<i>Sclerolaena eriacantha</i>	+	0.10
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> <i>x helmsii</i>	+	0.40
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	3	1.50
<i>Senna stricta</i>	1	1.20
<i>Sporobolus australasicus</i>	+	0.20
<i>Trianthema glossostigma</i>	+	0.05
<i>Trianthema triquetra</i>	+	0.10
<i>Triodia wiseana</i>	+	0.30

**API Resource Area****Site****RAOPP****Location:****Type:** O**1st Observation: Date:****Described by:****Seasonal Conditions:****2nd Observation: Date:****Described by:****Seasonal Conditions:****MGA Zone:** Easting: mE**Northing:** mN**Habitat:****Soil:****Rock Type:****Vegetation:****Vegetation Code:****Vegetation Desc:****Veg Condition:****Fire Age:****Notes:** Opportunistic Collections**Species List**

<b>Name</b>	<b>% Cover</b>	<b>Height</b>
<i>Corchorus lasiocarpus</i> ?subsp.		
<i>Corymbia hamersleyana</i>		
<i>Cullen leucochaetes</i>	+	0.6
<i>Eragrostis tenellula</i>	+	0.2
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>		
<i>Eremophila longifolia</i>		
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>		
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>		
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>		
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	+	0.2
<i>Glinus lotoides</i>		
<i>Harnieria kempeana</i> subsp. <i>muelleri</i>	+	
<i>Peripleura arida</i>		
<i>Polycarpaea holtzei</i>		
<i>Ptilotus helipteroides</i>		
<i>Rhagodia eremaea</i>		
<i>Solanum phlomoides</i>		
<i>Swainsona complanata</i>		
<i>Swainsona decurrens</i>		
<i>Swainsona maccullochiana</i>		
<i>Tephrosia clementii</i>		
<i>Tephrosia densa</i>		
<i>Triumfetta maconochieana</i>		

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## **Appendix J: Relevè and Quadrat Photos**

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Plate J.1: Quadrat 1GP02, April 2011.



Plate J.2: Quadrat 1GP03, April 2011.



Plate J.3: Quadrat 1GP06, April 2011.



Plate J.4: Quadrat 1GP10, April 2011.



Plate J.5: Revele 1GPr01, June 2011.



Plate J.6: Revele 1GPr04, April 2011.



Plate J.7: Releve 1GPr08, April 2011.



Plate J.8: Releve 1GPr12, April 2011.



Plate J.9: Quadrat 1RA01, April 2011.



Plate J.10: Quadrat 1RA02, April 2011.



Plate J.11: Quadrat 1RA03, April 2011.



Plate J.12: Quadrat 1RA04, May 2011.





Plate J.13: Quadrat 1RA05, May 2011.



Plate J.14: Quadrat 1RA06, May 2011.



Plate J.15: Quadrat 1RA07, May 2011.



Plate J.16: Quadrat 1RA08, May 2011.



Plate J.17: Quadrat 1RA09, May 2011.



Plate J.18: Quadrat 1RA11, May 2011.

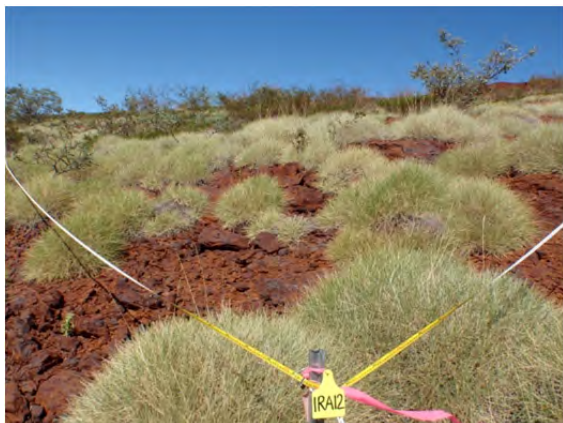


Plate J.19: Quadrat 1RA12, May 2011.



Plate J.20: Quadrat 1RA13, May 2011.



Plate J.21: Quadrat 1RA14, May 2011.



Plate J.22: Quadrat 1RA14b, May 2011.

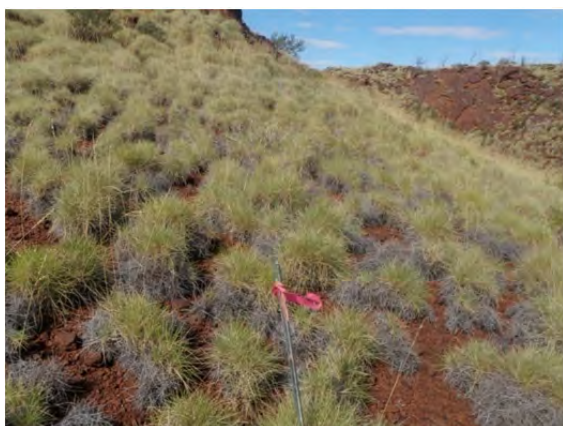


Plate J.23: Quadrat 1RA15, May 2011.



Plate J.24: Quadrat 1RA16, May 2011.



Plate J.25: Quadrat 1RA17, May 2011.

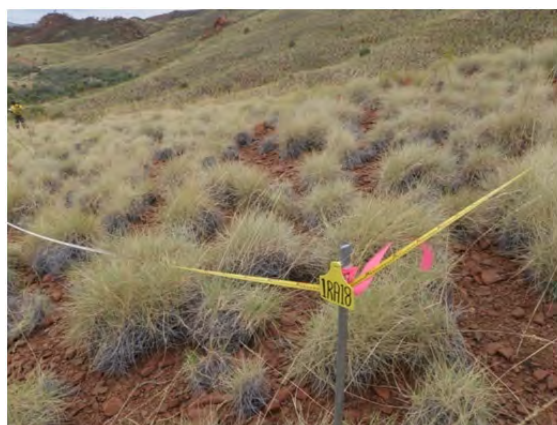


Plate J.26: Quadrat 1RA18, May 2011.



Plate J.27: Quadrat 1RA19, May 2011.



Plate J.28: Quadrat 1RA20, May 2011.



Plate J.29: Quadrat 1RA21, May 2011.



Plate J.30: Quadrat 1RA22, May 2011.



Plate J.31: Quadrat 1RA23, May 2011.



Plate J.32: Quadrat 1RA24, May 2011.



Plate J.33: Quadrat 1RA25, April 2011.



Plate J.34: Quadrat 1RA26, May 2011.



Plate J.35: Quadrat 1RA27, May 2011.



Plate J.36: Quadrat 1RA28, May 2011.



Plate J.37: Quadrat 1RA29, April 2011.



Plate J.38: Quadrat 1RA30, May 2011.



Plate J.39: Quadrat 1RA31, May 2011.



Plate J.40: Quadrat 1RA32, May 2011.



Plate J.41: Quadrat 1RA33, May 2011.



Plate J.42: Quadrat 1RA34, May 2011.



Plate J.43: Quadrat 1RA35, May 2011.



Plate J.44: Quadrat 1RA36, May 2011.



Plate J.45: Quadrat 1RA37, May 2011.



Plate J.46: Quadrat 1RA38, May 2011.



Plate J.47: Quadrat 1RA40, May 2011.



Plate J.48: Quadrat 1RA45, June 2011.



Plate J.49: Quadrat 1RA46, April 2011.



Plate J.50: Releve 2GPr01, April 2011.



Plate J.51: Releve 1RAr10, May 2011.



Plate J.52: Releve 2GPr02, April 2011.



Plate J.53: Quadrat 2RA01, April 2011.



Plate J.54: Quadrat 2RA02, April 2011.



Plate J.55: Quadrat 2RA05, April 2011.



Plate J.56: Quadrat 2RA07, May 2011.



Plate J.57: Quadrat 2RA08, April 2011.



Plate J.58: Quadrat 2RA10, May 2011.



Plate J.59: Quadrat 2RA11, April 2011.



Plate J.60: Quadrat 2RA12, May 2011.





Plate J.61: Quadrat 2RA13, May 2011.

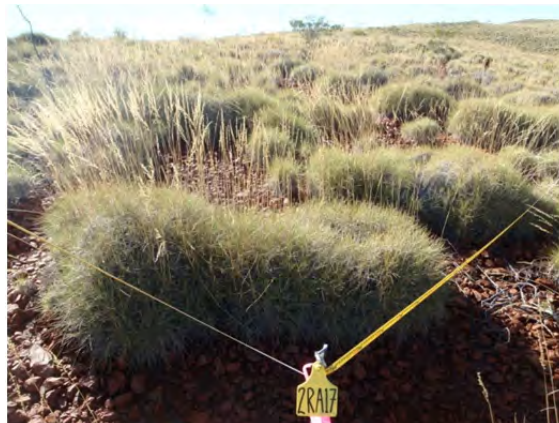


Plate J.62: Quadrat 2RA17, June 2011.



Plate J.63: Quadrat 2RA18, May 2011.



Plate J.64: Quadrat 2RA19, May 2011.



Plate J.65: Quadrat 2RA22, May 2011.



Plate J.66: Releve 2RAr03, April 2011.



Plate J.67: Releve 2RAr04, April 2011.



Plate J.68: Releve 2RAr06, April 2011.



Plate J.69: Releve 2RAr09, April 2011.



Plate J.70: Releve 2RAr14, May 2011.



Plate J.71: Releve 2RAr15, May 2011.



Plate J.72: Releve 2RAr16, May 2011.



Plate J.73: Releve 2RAr20, May 2011.



Plate J.74: Releve 2RAr21, May 2011.



Plate J.75: Releve 3RAr01, May 2011.



Plate J.76: Releve 3RAr02, May 2011.



Plate J.77: Releve 3RAr03, May 2011.



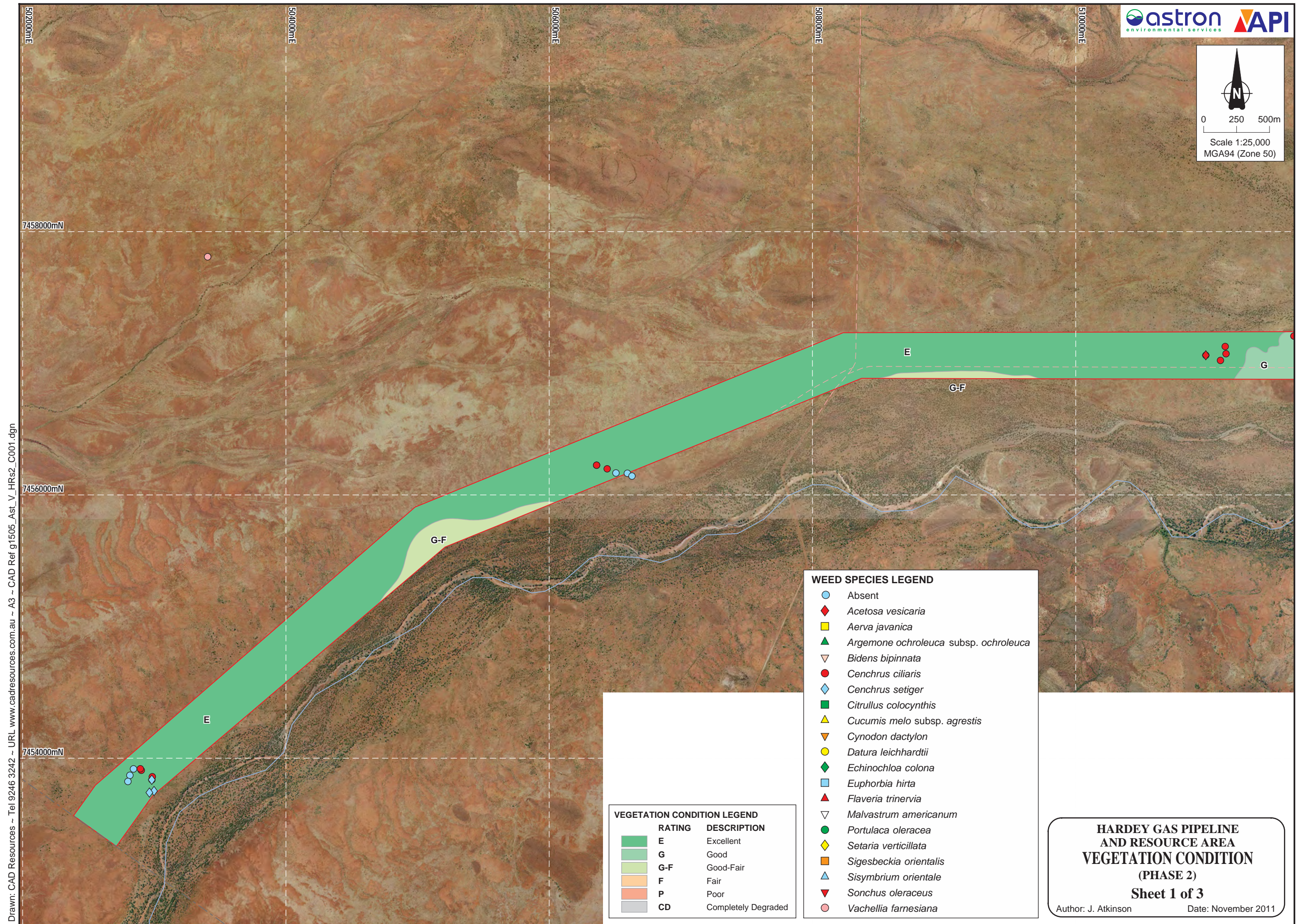
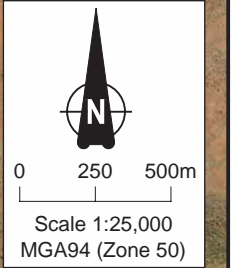
Plate J.78: Releve 3RAr04, May 2011.



Plate J.79: Releve 6RAr01, May 2011.

## **Appendix K: Map of Vegetation Condition and Introduced Flora Locations**

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Drawn: CAD Resources ~ Tel 9246 3242 ~ URL www.cadresources.com.au ~ A3 ~ CAD Ref g1505\_Ast\_V\_HRs2\_C001.dgn

VEGETATION CONDITION LEGEND		
RATING	DESCRIPTION	
E	Excellent	
G	Good	
G-F	Good-Fair	
F	Fair	
P	Poor	
CD	Completely Degraded	

WEED SPECIES LEGEND	
○	Absent
◆	<i>Acetosa vesicaria</i>
■	<i>Aerva javanica</i>
▲	<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>
▽	<i>Bidens bipinnata</i>
●	<i>Cenchrus ciliaris</i>
◇	<i>Cenchrus setiger</i>
■	<i>Citrullus colocynthis</i>
▲	<i>Cucumis melo</i> subsp. <i>agrestis</i>
▽	<i>Cynodon dactylon</i>
●	<i>Datura leichhardtii</i>
◆	<i>Echinochloa colona</i>
■	<i>Euphorbia hirta</i>
▲	<i>Flaveria trinervia</i>
▽	<i>Malvastrum americanum</i>
●	<i>Portulaca oleracea</i>
◆	<i>Setaria verticillata</i>
■	<i>Sigesbeckia orientalis</i>
▲	<i>Sisymbrium orientale</i>
▽	<i>Sonchus oleraceus</i>
○	<i>Vachellia farnesiana</i>

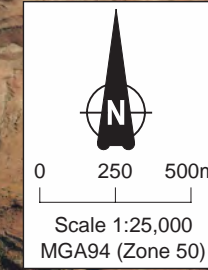
**HARDEY GAS PIPELINE  
AND RESOURCE AREA  
VEGETATION CONDITION  
(PHASE 2)**

**Sheet 1 of 3**

Author: J. Atkinson      Date: November 2011

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**WEED SPECIES LEGEND**

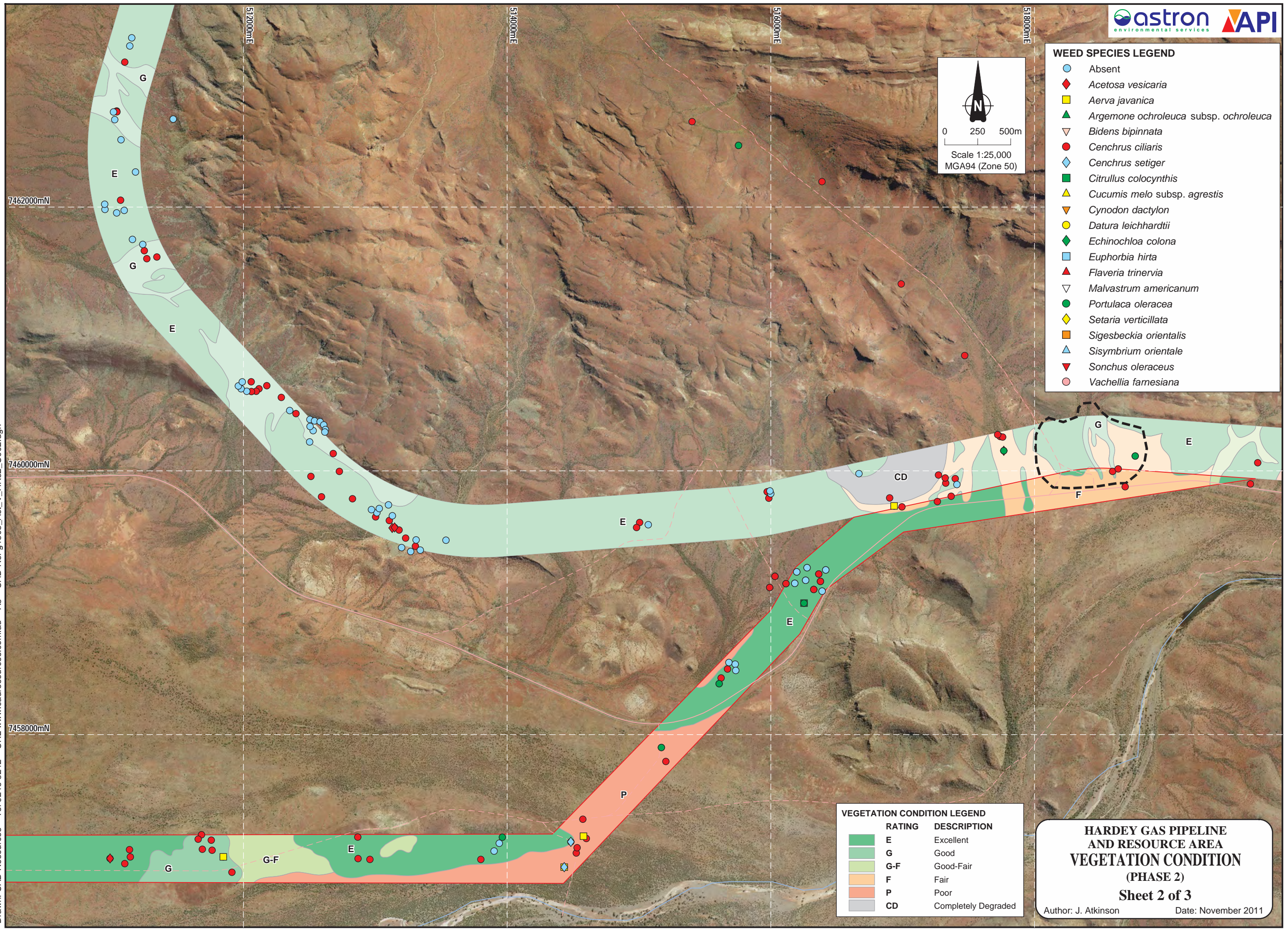
- Absent
- ◆ *Acetosa vesicaria*
- *Aerva javanica*
- ▲ *Argemone ochroleuca* subsp. *ochroleuca*
- ▽ *Bidens bipinnata*
- *Cenchrus ciliaris*
- ◇ *Cenchrus setiger*
- *Citrullus colocynthis*
- ▲ *Cucumis melo* subsp. *agrestis*
- ▽ *Cynodon dactylon*
- *Datura leichhardtii*
- ◆ *Echinochloa colona*
- *Euphorbia hirta*
- ▲ *Flaveria trinervia*
- ▽ *Malvastrum americanum*
- *Portulaca oleracea*
- ◆ *Setaria verticillata*
- *Sigesbeckia orientalis*
- ▲ *Sisymbrium orientale*
- ▽ *Sonchus oleraceus*
- *Vachellia farnesiana*

**VEGETATION CONDITION LEGEND**

RATING	DESCRIPTION
E	Excellent
G	Good
G-F	Good-Fair
F	Fair
P	Poor
CD	Completely Degraded

**HARDEY GAS PIPELINE AND RESOURCE AREA VEGETATION CONDITION (PHASE 2)**  
**Sheet 2 of 3**  
 Author: J. Atkinson Date: November 2011

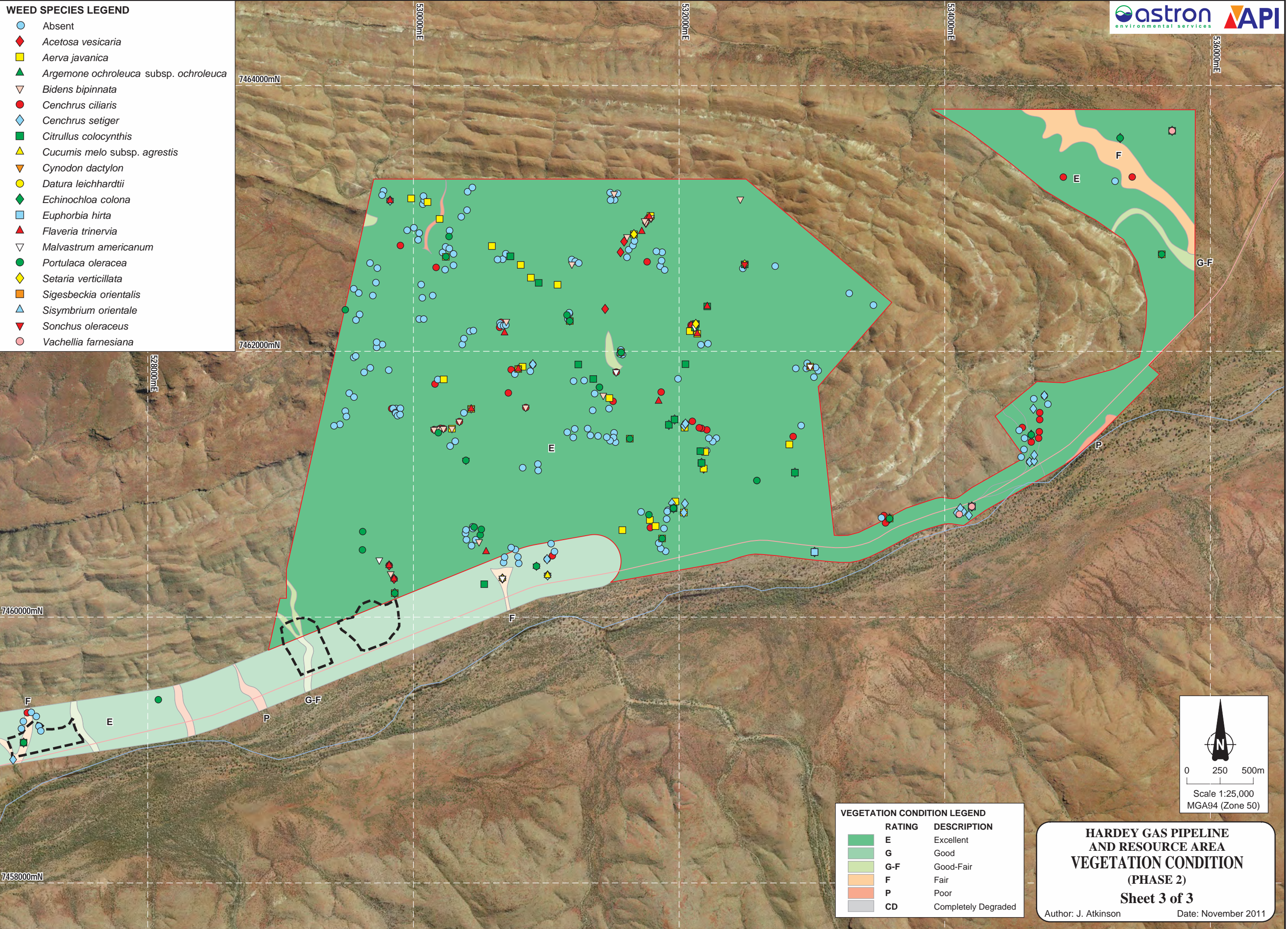
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**WEED SPECIES LEGEND**

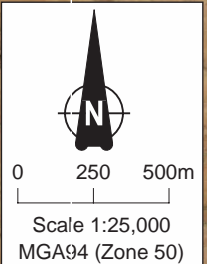
- Absent
- ◆ *Acetosa vesicaria*
- *Aerva javanica*
- ▲ *Argemone ochroleuca* subsp. *ochroleuca*
- ▽ *Bidens bipinnata*
- *Cenchrus ciliaris*
- ◆ *Cenchrus setiger*
- *Citrullus colocynthis*
- ▲ *Cucumis melo* subsp. *agrestis*
- ▽ *Cynodon dactylon*
- *Datura leichhardtii*
- ◆ *Echinochloa colona*
- *Euphorbia hirta*
- ▲ *Flaveria trinervia*
- ▽ *Malvastrum americanum*
- *Portulaca oleracea*
- ◆ *Setaria verticillata*
- *Sigesbeckia orientalis*
- ▲ *Sisymbrium orientale*
- ▽ *Sonchus oleraceus*
- *Vachellia farnesiana*



Drawn: CAD Resources ~ Tel 9246 3242 ~ URL www.cadresources.com.au ~ A3 ~ CAD Ref g1505\_Ast\_V\_HRs2\_C003.dgn

**VEGETATION CONDITION LEGEND**

RATING	DESCRIPTION
<span style="color: green;">■</span> E	Excellent
<span style="color: green;">■</span> G	Good
<span style="color: lightgreen;">■</span> G-F	Good-Fair
<span style="color: yellow;">■</span> F	Fair
<span style="color: orange;">■</span> P	Poor
<span style="color: grey;">■</span> CD	Completely Degraded



**HARDEY GAS PIPELINE  
AND RESOURCE AREA  
VEGETATION CONDITION  
(PHASE 2)**

**Sheet 3 of 3**

Author: J. Atkinson      Date: November 2011

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## **Appendix L: Vegetation Attributes Assessment**

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Table L1: Vegetation Attributes Table (\* indicates that no survey sites were recorded in this vegetation association therefore limited information is available).

Attribute Categories	Area and Location Specific Attribute			Component Specific Attribute						Condition Specified Attribute	Representation (Proportion of HRA) (%)	Representation (Proportion of HGP) (%)	Number of Attributes Categories
	Vegetation Association	Land System	Reservation Priority Hamersley (Kendrick 2001a)	Reservation Priority Hamersley (Kendrick 2001b)	Floristic values	Ecological values	Threat (Kendrick 2001a, Kendrick 2001b)	Function	Resilience				
	Restricted / Outlier	High / Medium	High / Medium	Declared Rare Flora / Priority Flora / Range Extension	TEC / PEC	At Risk'	Potential Restricted Habitat	Sensitivity	Habitat Specific	Excellent			3 = ● 2 = ● 1 = ●
Hi03									<i>Nicotiana</i> spp.	Excellent	10.0	0.0	1
Hi04				<i>Nicotiana umbratica</i>			Rockpiles		<i>Lobelia heterophylla</i> , <i>Nicotiana</i> spp.	Excellent	0.2	0.0	2
Hi08				<i>Nicotiana umbratica</i>					<i>Nicotiana</i> spp.	Excellent	4.9	0.0	2
Hi09										Excellent	2.5	0.0	1
Hi14										Excellent	0.1	0.0	1
Hi16									<i>Nicotiana</i> spp.	Excellent	2.5	0.0	2
Hi19			82: Medium							Excellent	3.1	0.0	2
Hi22						Hill-top floras, Hamersley Range (Hamersley)	Caves/overhangs		<i>Astrotricha hamptonii</i> , <i>Lobelia heterophylla</i> , <i>Ficus brachypoda</i> , <i>Nicotiana</i> spp.	Excellent	1.4	0.0	2
HBr4									<i>Nicotiana</i> spp.	Excellent	53.1		2
HBr25*										Excellent		1.0	1
PI08		181: Medium	181: High			Valley Floor Mulga (Hamersley)		<i>Acacia aptaneura</i> (2%)		Excellent	0.7	0.0	3
PI07*										Excellent		4.2	1
PI10		160: High	160: High					<i>Acacia aptaneura</i> (2%)		Excellent	5.7	0.2	3

Attribute Categories	Area and Location Specific Attribute			Component Specific Attribute						Condition Specified Attribute	Representation (Proportion of Survey Area) (%)	Representation (Proportion of Survey Area) (%)	Number of Attributes Categories
	Vegetation Association	Land System	Reservation Priority Hamersley (Kendrick 2001a)	Reservation Priority Hamersley (Kendrick 2001b)	Floristic values	Ecological values	Threat (Kendrick 2001a, Kendrick 2001b)	Function	Resilience				
	Restricted / Outlier	High / Medium	High / Medium	Declared Rare Flora / Priority Flora / Range Extension	TEC / PEC	At Risk'	Potential Restricted Habitat	Sensitivity	Habitat Specific	Excellent			3 = ● 2 = ● 1 = ●
Pl11	Cheela	162: High	162: High					<i>Acacia aptaneura</i> (4%)		Excellent		14.2	3
Ma01						All major ephemeral water courses (Hamersley)	River / major creek	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i> (10%)	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>		0.1	0.0	1
Ma03						All major ephemeral water courses (Hamersley)	River / major creek		<i>Eucalyptus victrix</i> , <i>Nicotiana</i> spp.		5.3	0.0	1
Ma04							Soak / spring				0.2	0.0	
Mi02							Soak / spring	<i>Acacia aptaneura</i> (5%)	<i>Nicotiana</i> spp.		2.7	0.0	1
Mi05*								<i>Acacia aptaneura</i>		Excellent		1.0	2
Mi06											1.5	12.0	0
Mi08						Mulga creekline community (Ashburton)		<i>Acacia aptaneura</i> (2-4%)		Excellent	2.3	0.1	2
Mi12*										Excellent		0.6	1
Mi15						Mulga creekline community (Ashburton)		<i>Acacia aptaneura</i> (8%)				3.2	1
mDr32	Cheela							<i>Acacia aptaneura</i> (5%)			2.7	63.6	2

\* no survey sites were included in this vegetation association therefore limited information is available.



## Appendix M: Mulga (*Acacia aptaneura*) Locations

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Table M.1: Locations of Mulga (*Acacia aptaneura*) in the Survey Area.

Quadrat / Releve	Vegetation Association	Density (%)	Habitat	Easting	Northing
1GPr01	Mi15	8	Minor drainage line and outwash flow plains.	516252	7458997
1RA03	PI08	1	South west sloping plain with cobble-sized rocky mantle.	531958	7460819
1RA06	Hi08	45	Hill crest with exposed rocks.	531563	7461993
1RA08	Hi08	35	Moderately steep east facing slope, near the crest of a hill.	530244	7462711
1RA11	Hi22	<2	South face of rocky hill.	529837	7461568
1RA13	Hi19	<2	South-east sloping with stoney pavements and small crags.	529393	7461510
1RA17	Hi08	15	Southeast facing rocky slope with outcrops.	531177	7462228
1RA19	Hi22	4	South facing cliffs and breakaways.	530395	7461179
1RA20	Hi09	2	North-east facing slope with minor drainage channel on west side.	530745	7461259
1RA21	Hi14	2	Top of high rocky hill. Incline to the southeast.	530852	7461153
1RA22	Hi09	5	Northeast edge on top of high rocky hill.	531177	7461433
1RA23	Hi09	3	Southeast edge on top of high rocky hill.	531629	7461343
1RA24	Hi14	1	North side on top of high rocky hill with outcropping ironstone.	531367	7461453
1RA25	Hi08	20	Southeast facing slope into narrow valley.	530845	7461578
1RA26	Hi08	4	Northwest facing slope leading to flood plain from breakaways.	531297	7461601
1RA27	Hi08	5	North facing rocky slope with small crags.	531503	7461624
1RA30	Hi16	<2	Gentle incline to the west on top of rocky hill.	530155	7462353
1RA35	Hi08	1	Breakaway rock formation forming steep sided ridge running east-west.	530029	7462584
1RA46	Mi08	4	Drainage channel running north-south and flood banks.	529859	7460181
2RA01	PI10	<2	Flat plain in between minor and major drainage lines surrounded by low hills.	534715	7461539
2RA11	Mi06	<2	Minor creekline.	532872	7461087
2RA13	HBr4	<2	Stony top of low rise.	532137	7462132
2RAr03	Mi08	2	Minor incised drainage channel draining low hill range.	534651	7461372
2RAr04	mDr32	<2	Broad floodplain.	535712	7463659

Quadrat / Releve	Vegetation Association	Density (%)	Habitat	Easting	Northing
2RAr16	Hi08	2	Rocky breakaway (hill).	531193	7462655
2RAr21	Mi02	5	Minor drainage channel through steep sided hills.	531511	7463185
3RAr01	Hi03	<2	Southwest facing mid-slopes, below breakaways.	530434	7462127

## Appendix N: Species List

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Table N.1: Flora Species List.

Family	Species	Conservation Priority	Weed (*)
Acanthaceae	<i>Dicladanthera forrestii</i>		
	<i>Harnieria kempeana</i> subsp. <i>muelleri</i>		
Aizoaceae	<i>Trianthema glossostigma</i>		
	<i>Trianthema oxycalyptra</i> var. <i>oxycalyptra</i>		
	<i>Trianthema triquetra</i>		
	<i>Zaleya galericulata</i> subsp. <i>galericulata</i>		
Amaranthaceae	<i>Aerva javanica</i>		*
	<i>Alternanthera nana</i>		
	<i>Amaranthus cuspidifolius</i>		
	<i>Amaranthus interruptus</i>		
	<i>Amaranthus mitchellii</i>		
	<i>Amaranthus undulatus</i>		
	<i>Gomphrena canescens</i> subsp. <i>canescens</i>		
	<i>Gomphrena cunninghamii</i>		
	<i>Gomphrena kanisii</i>		
	<i>Ptilotus aevroides</i>		
	<i>Ptilotus astrolasius</i>		
	<i>Ptilotus auriculifolius</i>		
	<i>Ptilotus axillaris</i>		
	<i>Ptilotus calostachyus</i>		
	<i>Ptilotus clementii</i>		
	<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>		
	<i>Ptilotus fusiformis</i>		
	<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>		
	<i>Ptilotus helipteroides</i>		
	<i>Ptilotus obovatus</i>		
	<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>		
	<i>Ptilotus villosiflorus</i>		
Apocynaceae	<i>Cynanchum floribundum</i>		
	<i>Marsdenia australis</i>		
Araliaceae	<i>Astrotricha hamptonii</i>		
	<i>Trachymene oleracea</i> subsp. <i>oleracea</i>		
	<i>Trachymene pilbarensis</i>		
Asteraceae	<i>Bidens bipinnata</i>		*
	<i>Centipeda minima</i> subsp. <i>macrocephala</i>		
	<i>Flaveria trinervia</i>		*

Family	Species	Conservation Priority	Weed (*)
	<i>Helichrysum luteoalbum</i>		
	<i>Peripleura arida</i>		
	<i>Pluchea dentex</i>		
	<i>Pluchea rubelliflora</i>		
	<i>Pterocaulon sphacelatum</i>		
	<i>Pterocaulon sphaeranthoides</i>		
	<i>Rhodanthe margarethae</i>		
	<i>Sonchus oleraceus</i>		*
	<i>Streptoglossa decurrens</i>		
Boraginaceae	<i>Heliotropium heteranthum</i>		
	<i>Heliotropium inexplicitum</i>		
	<i>Trichodesma zeylanicum</i> ?var.		
	<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>		
Brassicaceae	<i>Lepidium oxytrichum</i>		
	<i>Lepidium pedicellosum</i>		
	<i>Lepidium platypetalum</i>		
	<i>Sisymbrium orientale</i>		*
Campanulaceae	<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh		
Capparaceae	<i>Capparis spinosa</i> var. <i>nummularia</i>		
Caryophyllaceae	<i>Polycarpaea corymbosa</i>		
	<i>Polycarpaea holtzei</i>		
	<i>Polycarpaea longiflora</i>		
Chenopodiaceae	<i>Dysphania rhadinostachya</i> ?subsp.		
	<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>		
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>		
	<i>Maireana</i> ? <i>triptera</i>		
	<i>Maireana georgei</i>		
	<i>Maireana melanocoma</i>		
	<i>Maireana planifolia</i>		
	<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>		
	<i>Maireana villosa</i>		
	<i>Rhagodia eremaea</i>		
	<i>Salsola tragus</i> subsp. <i>tragus</i>		
	<i>Sclerolaena costata</i>		
	<i>Sclerolaena densiflora</i>		
	<i>Sclerolaena eriacantha</i>		
Cleomaceae	<i>Cleome viscosa</i>		



Family	Species	Conservation Priority	Weed (*)
Convolvulaceae	<i>Bonamia media</i> var. <i>villosa</i>		
	<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>		
	<i>Convolvulus clementii</i>		
	<i>Duperreya commixta</i>		
	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>		
	<i>Ipomoea muelleri</i>		
	<i>Operculina aequisejala</i>		
	<i>Polymeria longifolia</i>		
Cucurbitaceae	<i>Citrullus colocynthis</i>		*
	<i>Cucumis maderaspatanus</i>		
	<i>Cucumis melo</i> subsp. <i>agrestis</i>		*
Cyperaceae	<i>Bulbostylis barbata</i>		
	<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>		
	<i>Cyperus vaginatus</i>		
Elatinaceae	<i>Bergia</i> sp.		
Euphorbiaceae	<i>Euphorbia alsiniflora</i>		
	<i>Euphorbia australis</i>		
	<i>Euphorbia biconvexa</i>		
	<i>Euphorbia boophthona</i>		
	<i>Euphorbia boophthona/tannensis</i>		
	<i>Euphorbia hirta</i>		*
	<i>Euphorbia schultzii</i>		
	<i>Euphorbia</i> sp. (PAN5-15)		
	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>		
	<i>Euphorbia wheeleri</i>		
Fabaceae	<i>Acacia aptaneura</i>		
	<i>Acacia arida</i>		
	<i>Acacia atkinsiana</i>		
	<i>Acacia bivenosa</i>		
	<i>Acacia citrinoviridis</i>		
	<i>Acacia coriacea</i> subsp. <i>pendens</i>		
	<i>Acacia hamersleyensis</i>		
	<i>Acacia inaequilatera</i>		
	<i>Acacia kempeana</i>		
	<i>Acacia maitlandii</i>		
	<i>Acacia marramamba</i>		
	<i>Acacia pruinocarpa</i>		

Family	Species	Conservation Priority	Weed (*)
	<i>Acacia pyrifolia</i> ?var.		
	<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>		
	<i>Acacia rhodophloia</i>		
	<i>Acacia sibirica</i>		
	<i>Acacia spondylophylla</i>		
	<i>Acacia synchronicia</i>		
	<i>Acacia tetragonophylla</i>		
	<i>Acacia wanyu</i>		
	<i>Acacia xiphophylla</i>		
	<i>Alysicarpus muelleri</i>		
	<i>Crotalaria medicaginea</i> var. <i>neglecta</i>		
	<i>Cullen leucochaites</i>		
	<i>Glycine canescens</i>		
	<i>Indigofera colutea</i>		
	<i>Indigofera monophylla</i>		
	<i>Petalostylis labicheoides</i>		
	<i>Rhynchosia minima</i>		
	<i>Senna artemisioides</i> subsp. <i>helmsii</i>		
	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>		
	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thinly sericeous)		
	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>		
	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>		
	<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>		
	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>		
	<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>		
	<i>Senna notabilis</i>		
	<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)		
	<i>Senna stricta</i>		
	<i>Swainsona complanata</i>		
	<i>Swainsona decurrens</i>		
	<i>Swainsona maccullochiana</i>		
	<i>Tephrosia clementii</i>		
	<i>Tephrosia densa</i>		
	<i>Tephrosia rosea</i> var. <i>glabrior</i>		
	<i>Tephrosia rosea</i> var. <i>rosea</i>		
	<i>Tephrosia</i> aff. <i>supina</i>		
	<i>Vachellia farnesiana</i>		*

Family	Species	Conservation Priority	Weed (*)
Goodeniaceae	<i>Goodenia forrestii</i>		
	<i>Goodenia microptera</i>		
	<i>Goodenia muelleriana</i>		
	<i>Goodenia stobbsiana</i>		
	<i>Goodenia tenuiloba</i>		
	<i>Scaevola acacioides</i>		
	<i>Scaevola spinescens</i>		
Gyrostemonaceae	<i>Codonocarpus cotinifolius</i>		
Lamiaceae	<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>		
	<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>		
Loranthaceae	<i>Amyema fitzgeraldii</i>		
Lythraceae	<i>Ammannia multiflora</i>		
Malvaceae	<i>Abutilon dioicum</i>		
	<i>Abutilon fraseri</i>		
	<i>Abutilon lepidum</i>		
	<i>Corchorus crozophorifolius</i>		
	<i>Corchorus laniflorus</i>		
	<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>		
	<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		
	<i>Corchorus tridens</i>		
	<i>Gossypium australe</i> (Burrup Peninsula form)		
	<i>Gossypium australe</i> (Whim Creek form)		
	<i>Gossypium robinsonii</i>		
	<i>Hibiscus burtonii</i>		
	<i>Hibiscus coatesii</i>		
	<i>Hibiscus gardneri</i>		
	<i>Hibiscus haynaldii</i>		
	<i>Hibiscus sturtii</i> var. <i>platychlamys</i>		
	<i>Keraudrenia nephrosperma</i>		
	<i>Malvastrum americanum</i>		*
	<i>Melhania oblongifolia</i>		
	<i>Sida clementii</i>		
<i>Sida echinocarpa</i>			
<i>Sida fibulifera</i>			
<i>Sida</i> sp. Pilbara (A.A Mitchell PRP 1543)			
<i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90)			
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)			

Family	Species	Conservation Priority	Weed (*)
	<i>Triumfetta clementii</i>		
	<i>Triumfetta maconochieana</i>		
Molluginaceae	<i>Glinus lotoides</i>		
	<i>Mollugo molluginea</i>		
Moraceae	<i>Ficus brachypoda</i>		
Myrtaceae	<i>Corymbia ferritcola</i>		
	<i>Corymbia flavescens</i>		
	<i>Corymbia hamersleyana</i>		
	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>		
	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		
	<i>Eucalyptus victrix</i>		
	<i>Eucalyptus xerothermica</i>		
	<i>Melaleuca glomerata</i>		
	<i>Melaleuca lasiandra</i>		
Nyctaginaceae	<i>Boerhavia coccinea</i>		
	<i>Boerhavia gardneri</i>		
	<i>Boerhavia repleta</i>		
Oleaceae	<i>Jasminum didymum</i> subsp. <i>lineare</i>		
Papaveraceae	<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>		*
Phyllanthaceae	<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>		
	<i>Phyllanthus erwinii</i>		
	<i>Phyllanthus maderaspatensis</i>		
	<i>Sauropus crassifolius</i>		
Plantaginaceae	<i>Stemodia grossa</i>		
Plumbaginaceae	<i>Plumbago zeylanica</i>		
Poaceae	<i>Aristida contorta</i>		
	<i>Brachyachne prostrata</i>		
	<i>Cenchrus ciliaris</i>		*
	<i>Cenchrus setiger</i>		*
	<i>Chrysopogon fallax</i>		
	<i>Cymbopogon ambiguus</i>		
	<i>Cymbopogon obtectus</i>		
	<i>Dactyloctenium radulans</i>		
	<i>Dichanthium sericeum</i> subsp. <i>humilius</i>		
	<i>Digitaria ctenantha</i>		
	<i>Enneapogon caerulescens</i>		
	<i>Enneapogon lindleyanus</i>		

Family	Species	Conservation Priority	Weed (*)
	<i>Enneapogon polyphyllus</i>		
	<i>Enneapogon robustissimus</i>		
	<i>Eragrostis cumingii</i>		
	<i>Eragrostis eriopoda</i>		
	<i>Eragrostis pergracilis</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 pulchella</i> subsp. <i>dominii</i>		
	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>		
	<i>Eriachne tenuiculmis</i>		
	<i>Iseilema dolichotrichum</i>		
	<i>Iseilema eremaeum</i>		
	<i>Iseilema membranaceum</i>		
	<i>Paraneurachne muelleri</i>		
	<i>Paspalidium clementii</i>		
	<i>Perotis rara</i>		
	<i>Schizachyrium fragile</i>		
	<i>Setaria verticillata</i>		*
	<i>Sporobolus australasicus</i>		
	<i>Themeda triandra</i>		
	<i>Tragus australianus</i>		
	<i>Triodia angusta</i>		
	<i>Triodia epactia</i>		
	<i>Triodia wiseana</i>		
	<i>Tripogon loliformis</i>		
Polygalaceae	<i>Polygala isingii</i>		
Polygonaceae	<i>Acetosa vesicaria</i>		*
Portulacaceae	<i>Calandrinia schistorhiza</i>		
	<i>Calandrinia</i> sp.		
	<i>Portulaca oleracea</i>		*
	<i>Portulaca pilosa</i>		
Proteaceae	<i>Grevillea berryana</i>		
	<i>Hakea chordophylla</i>		
	<i>Hakea lorea</i> subsp. <i>lorea</i>		

Family	Species	Conservation Priority	Weed (*)
Pteridaceae	<i>Cheilanthes brownii</i>		
	<i>Cheilanthes lasiophylla</i>		
	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>		
Rubiaceae	<i>Oldenlandia crouchiana</i>		
Santalaceae	<i>Santalum lanceolatum</i>		
	<i>Dodonaea pachyneura</i>		
	<i>Dodonaea petiolaris</i>		
Scrophulariaceae	<i>Eremophila cryptothrix</i>		
	<i>Eremophila cuneifolia</i>		
	<i>Eremophila exilifolia</i>		
	<i>Eremophila forrestii</i> ?subsp.		
	<i>Eremophila fraseri</i> ?subsp.		
	<i>Eremophila fraseri</i> subsp. <i>fraseri</i>		
	<i>Eremophila latrobei</i> subsp. <i>filiformis</i>		
	<i>Eremophila latrobei</i> subsp. <i>glabra</i>		
	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>		
	<i>Eremophila longifolia</i>		
	<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>		
	<i>Eremophila tietkensis</i>		
Solanaceae	<i>Datura leichhardtii</i>		*
	<i>Nicotiana ?umbratica</i>	P3	
	<i>Nicotiana benthamiana</i>		
	<i>Nicotiana occidentalis</i> subsp. <i>obliqua</i>		
	<i>Nicotiana occidentalis</i> subsp. <i>occidentalis</i>		
	<i>Nicotiana umbratica</i>	P3	
	<i>Solanum ashbyae</i>		
	<i>Solanum ellipticum</i>		
	<i>Solanum ferocissimum</i>		
	<i>Solanum gabrielae</i>		
	<i>Solanum horridum</i>		
	<i>Solanum lasiophyllum</i>		
	<i>Solanum phlomoides</i>		
	<i>Solanum sturtianum</i>		
Surianaceae	<i>Stylobasium spathulatum</i>		
Violaceae	<i>Hybanthus aurantiacus</i>		
Zygophyllaceae	<i>Tribulus hirsutus</i>		
	<i>Tribulus suberosus</i>		

## Appendix O: Site by Species Matrix

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Table O.1: Phase 1 and Phase 2 Total Site by Species Matrix.

Species	1GP02	1GP03	1GP06	1GP10	1GP01	1GP04	1GP08	1GP12	1RA02	1RA03	1RA04	1RA05	1RA06	1RA07	1RA08	1RA09	1RA11	1RA12	1RA13	1RA14	1RA14b	1RA15	1RA16	1RA17	1RA18	1RA19		
<i>Abutilon aff. lepidum</i> (A)										*						*				*				*		*		
<i>Abutilon dioicum</i>										*			*			*				*					*		*	
<i>Abutilon fraseri</i>												*															*	
<i>Acacia aptaneura</i>					*					*			*		*		*		*						*		*	
<i>Acacia arida</i>									*																*			
<i>Acacia atkinsiana</i>													*	*	*												*	
<i>Acacia bivenosa</i>												*	*	*		*						*					*	
<i>Acacia citrinoviridis</i>	*	*		*	*					*	*					*						*	*				*	
<i>Acacia coriacea</i> subsp. <i>pendens</i>										*																		
<i>Acacia hamersleyensis</i>																												
<i>Acacia inaequilatera</i>																	*		*									
<i>Acacia kempeana</i>					*	*		*											*	*	*					*		
<i>Acacia maitlandii</i>																	*	*	*									
<i>Acacia marramamba</i>																	*	*	*				*					
<i>Acacia pruinocarpa</i>																	*	*	*				*			*	*	
<i>Acacia pyrifolia</i> ?var.											*																	
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>																										*		
<i>Acacia rhodophloia</i>																												
<i>Acacia spondylophylla</i>																	*	*	*									
<i>Acacia synchronica</i>		*	*	*	*	*	*	*	*	*		*	*	*	*	*			*		*		*	*	*	*	*	
<i>Acacia tetragonophylla</i>		*	*	*	*	*	*	*	*	*		*	*	*	*	*	*								*	*	*	
<i>Acacia wanyu</i>				*				*																				
<i>Acacia xiphophylla</i>			*			*		*		*									*						*	*	*	
<i>Acetosa vesicaria</i>		*								*																		
<i>Aerva javanica</i>	*								*	*	*	*	*	*	*	*						*		*	*	*	*	
<i>Alternanthera nana</i>																												
<i>Alysicarpus muelleri</i>				*																								
<i>Amaranthus cuspidifolius</i>										*			*		*	*			*	*				*	*	*	*	
<i>Amaranthus interruptus</i>																	*											
<i>Amaranthus mitchellii</i>									*																			
<i>Amaranthus undulatus</i>																						*						
<i>Ammannia multiflora</i>																												
<i>Amyema fitzgeraldii</i>																									*			
<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>																												
<i>Aristida contorta</i>						*			*						*										*	*	*	
<i>Astrotricha hamptonii</i>																		*									*	
<i>Bergia</i> sp.																												
<i>Bidens bipinnata</i>													*		*	*									*	*	*	
<i>Boerhavia coccinea</i>		*	*	*	*			*	*	*	*	*	*	*	*	*						*		*	*	*	*	
<i>Boerhavia gardneri</i>													*															
<i>Boerhavia repleta</i>																												
<i>Boerhavia</i> sp.		*																										
<i>Bonamia media</i> var. <i>villosa</i>					*																							
<i>Brachyachne prostrata</i>										*																		
<i>Bulbostylis barbata</i>						*			*					*	*	*	*			*	*	*	*	*	*	*	*	
<i>Calandrinia schistorhiza</i>								*																				
<i>Calandrinia</i> sp.								*																				
<i>Capparis spinosa</i> var. <i>nummularia</i>																	*											
<i>Cenchrus ciliaris</i>	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Cenchrus setiger</i>	*									*	*	*																
<i>Centipeda minima</i> subsp. <i>macrocephala</i>																												
<i>Cheilanthes brownii</i>																							*					
<i>Cheilanthes lasiophylla</i>																											*	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>																	*											
<i>Chrysopogon fallax</i>				*																								
<i>Citrullus colocynthis</i>					*					*	*	*																
<i>Cleome viscosa</i>		*		*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>													*												*	*	*	
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>												*													*	*	*	
<i>Codonocarpus cotinifolius</i>																			*									
<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>																												
<i>Convolvulus clementii</i>															*	*												
<i>Corchorus crozophorifolius</i>				*	*					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Corchorus laniflorus</i>														*											*	*	*	
<i>Corchorus lasiocarpus</i> ?subsp.																												

Species	1GP02	1GP03	1GP06	1GP10	1GPr01	1GPr04	1GPr08	1GPr12	1RA02	1RA03	1RA04	1RA05	1RA06	1RA07	1RA08	1RA09	1RA11	1RA12	1RA13	1RA14	1RA14b	1RA15	1RA16	1RA17	1RA18	1RA19
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>									*																	
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>										*																*
<i>Corchorus</i> sp.										*																
<i>Corchorus tridens</i>		*		*	*							*				*										
<i>Corymbia ferritcola</i>																						*				*
<i>Corymbia flavescens</i>																										
<i>Corymbia hamersleyana</i>																										
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>										*	*	*				*						*				
<i>Cucumis maderaspatanus</i>				*	*				*	*	*	*	*		*	*	*			*	*	*		*		*
<i>Cucumis melo</i> subsp. <i>agrestis</i>																										
<i>Cullen leucochaetes</i>																										
<i>Cymbopogon ambiguus</i>														*	*		*					*	*		*	*
<i>Cymbopogon obtectus</i>																						*	*			
<i>Cymbopogon</i> sp.																										
<i>Cynanchum floribundum</i>																										*
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>												*						*								
<i>Cyperus vaginatus</i>												*														
<i>Dactyloctenium radulans</i>				*	*					*																
<i>Datura leichhardtii</i>																						*				
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>																										
<i>Dicladantha forrestii</i>																										
<i>Digitaria ctenantha</i>																										
<i>Dodonaea pachyneura</i>																	*					*		*		*
<i>Dodonaea petiolaris</i>													*													*
<i>Duperreya commixta</i>					*					*	*	*	*			*			*			*		*		*
<i>Dysphania rhadinostachya</i> ?subsp.																										
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>					*				*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Dysphania</i> sp.																										
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	*			*		*				*					*	*	*				*	*		*	*	*
<i>Enneapogon caeruleus</i>			*							*			*												*	*
<i>Enneapogon lindleyanus</i>						*			*				*	*					*	*	*	*	*	*	*	*
<i>Enneapogon polyphyllus</i>					*				*	*				*	*		*		*	*	*	*	*	*	*	*
<i>Enneapogon robustissimus</i>																										
<i>Eragrostis cumingii</i>												*														
<i>Eragrostis eriopoda</i>																										
<i>Eragrostis pergracilis</i>																										
<i>Eragrostis</i> sp.	*			*																						
<i>Eragrostis tenellula</i>																										
<i>Eragrostis xerophila</i>																										
<i>Eremophila cryptothrix</i>													*		*						*	*		*	*	*
<i>Eremophila cuneifolia</i>			*		*	*		*	*	*		*	*	*					*	*	*	*	*	*	*	*
<i>Eremophila exilifolia</i>																										
<i>Eremophila forrestii</i> ?subsp.	*	*			*																					
<i>Eremophila fraseri</i> ?subsp.				*																						
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>																										
<i>Eremophila latrobei</i> ?subsp.																						*				
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>					*																					
<i>Eremophila latrobei</i> subsp. <i>glabra</i>																										
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>																	*					*		*		*
<i>Eremophila longifolia</i>												*			*	*			*		*	*	*	*	*	*
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>													*											*		
<i>Eremophila</i> sp.																										
<i>Eremophila tietkensis</i>																										
<i>Eriachne aristidea</i>																										
<i>Eriachne mucronata</i>							*															*	*	*	*	*
<i>Eriachne mucronata</i> (arid form) (MET 12 736)															*	*	*		*	*	*	*	*	*	*	*
<i>Eriachne mucronata</i> (typical form)		*	*							*												*	*	*	*	*
<i>Eriachne pulchella</i> ?subsp.						*		*	*																	
<i>Eriachne pulchella</i> subsp. <i>dominii</i>															*	*	*	*	*	*	*	*	*	*	*	*
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>													*											*	*	*
<i>Eriachne</i> sp.																										
<i>Eriachne tenuiculmis</i>																						*				
<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>																										
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>																*	*				*	*	*	*	*	*
<i>Eucalyptus victrix</i>																										
<i>Eucalyptus xerothemica</i>																										*
<i>Euphorbia alsiniflora</i>																										

Species	1GP02	1GP03	1GP06	1GP10	1GPr01	1GPr04	1GPr08	1GPr12	1RA02	1RA03	1RA04	1RA05	1RA06	1RA07	1RA08	1RA09	1RA11	1RA12	1RA13	1RA14	1RA14b	1RA15	1RA16	1RA17	1RA18	1RA19	
<i>Euphorbia australis</i>			*						*											*							
<i>Euphorbia biconvexa</i>											*					*					*	*					
<i>Euphorbia boophthona</i>																											
<i>Euphorbia boophthona/tannensis</i>																											
<i>Euphorbia hirta</i>																											
<i>Euphorbia schultzei</i>																								*			
<i>Euphorbia</i> sp.															*												
<i>Euphorbia</i> sp. (PAN5-15)																											
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>									*							*				*							
<i>Euphorbia wheeleri</i>																											
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>				*	*					*		*	*		*									*		*	
<i>Ficus brachypoda</i>																											
<i>Flaveria trinervia</i>																*						*		*			
<i>Glinus lotoides</i>																											
<i>Glycine canescens</i>																											
<i>Gomphrena canescens</i> subsp. <i>canescens</i>						*																					
<i>Gomphrena cunninghamii</i>									*	*	*		*	*	*	*	*			*	*	*		*	*	*	*
<i>Gomphrena kanisii</i>													*				*										*
<i>Gomphrena</i> sp.			*																								
<i>Goodenia forrestii</i>	*			*																							
<i>Goodenia microptera</i>									*											*							
<i>Goodenia muelleriana</i>																											
<i>Goodenia</i> sp.																											
<i>Goodenia stobbsiana</i>																											
<i>Goodenia tenuiloba</i>					*																						
<i>Gossypium australe</i>										*																	
<i>Gossypium australe</i> (Burrup Peninsula form)																								*			
<i>Gossypium australe</i> (Whim Creek form)												*								*	*						
<i>Gossypium robinsonii</i>												*	*			*				*	*						
<i>Grevillea berryana</i>					*	*				*	*	*	*								*	*		*			
<i>Hakea chordophylla</i>																											
<i>Hakea lorea</i> subsp. <i>lorea</i>				*																							
<i>Harnieria kempeana</i> subsp. <i>muelleri</i>																											
<i>Helichrysum luteoalbum</i>									*																		
<i>Heliotropium heteranthum</i>																											
<i>Heliotropium inexplicitum</i>																											
<i>Hibiscus</i> aff. <i>coatesii</i>															*	*											*
<i>Hibiscus burtonii</i>			*																								*
<i>Hibiscus coatesii</i>									*				*											*			
<i>Hibiscus gardneri</i>						*																					
<i>Hibiscus haynaldii</i>																											*
<i>Hibiscus sturtii</i> var. <i>platyklamys</i>																*											
<i>Hybanthus aurantiacus</i>					*						*	*															
<i>Indigofera colutea</i>													*														
<i>Indigofera monophylla</i>												*				*					*						
<i>Ipomoea muelleri</i>																											
<i>Iseilema dolichotrichum</i>									*								*										
<i>Iseilema eremaum</i>										*				*													
<i>Iseilema membranaceum</i>										*				*													
<i>Jasminum didymum</i> subsp. <i>lineare</i>									*	*	*	*	*	*	*	*	*			*	*		*	*	*	*	*
<i>Keraudrenia nephrosperma</i>																											*
<i>Lepidium oxytrichum</i>																							*				
<i>Lepidium pedicellosum</i>																					*		*				
<i>Lepidium platypetalum</i>			*			*																					
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh													*	*	*	*	*	*	*	*	*						*
<i>Maireana ? georgei</i>																											
<i>Maireana ? triptera</i>																								*			
<i>Maireana georgei</i>															*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Maireana melanocoma</i>													*			*											
<i>Maireana planifolia</i>					*					*																	
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>						*																					
<i>Maireana villosa</i>			*		*			*																			*
<i>Malvastrum americanum</i>																											
<i>Marsdenia australis</i>																											
<i>Melaleuca glomerata</i>																											
<i>Melaleuca lasiandra</i>																											
<i>Melhanium oblongifolia</i>																											

Species	1GP02	1GP03	1GP06	1GP10	1GPr01	1GPr04	1GPr08	1GPr12	1RA02	1RA03	1RA04	1RA05	1RA06	1RA07	1RA08	1RA09	1RA11	1RA12	1RA13	1RA14	1RA14b	1RA15	1RA16	1RA17	1RA18	1RA19
<i>Mollugo molluginea</i>							*		*	*			*	*	*	*		*		*				*		*
<i>Nicotiana ?umbratica</i>																										
<i>Nicotiana benthamiana</i>													*				*					*		*		*
<i>Nicotiana occidentalis ?subsp.</i>																							*			
<i>Nicotiana occidentalis subsp. obliqua</i>																*										
<i>Nicotiana occidentalis subsp. occidentalis</i>																*										
<i>Nicotiana sp.</i>																										
<i>Nicotiana umbratica</i>																										
<i>Notoleptopus decaisnei</i> var. <i>Orbicularis</i>					*				*	*	*	*	*	*	*	*				*	*			*		*
<i>Oldenlandia crouchiana</i>									*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Operculina aequisejala</i>											*	*														
<i>Paraneurachne muelleri</i>											*	*														
<i>Paspalidium clementii</i>									*		*		*			*	*	*	*	*	*	*	*	*	*	*
<i>Peripleura arida</i>												*	*			*										*
<i>Perotis rara</i>																										
<i>Petalostylis labicheoides</i>											*	*										*				
<i>Phyllanthus erwinii</i>																*										
<i>Phyllanthus maderaspatensis</i>												*				*						*				
<i>Phyllanthus sp.</i>											*															
<i>Pluchea dentex</i>											*															
<i>Pluchea rubelliflora</i>																					*					
<i>Pluchea sp.</i>																										
<i>Plumbago zeylanica</i>																										
<i>Polycarpaea corymbosa</i>				*	*					*						*								*		
<i>Polycarpaea holtzei</i>														*	*									*		
<i>Polycarpaea longiflora</i>					*				*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Polygala isingii</i>																			*							
<i>Polymeria longifolia</i>													*													
<i>Portulaca oleracea</i>				*	*	*		*	*	*			*	*	*					*	*			*	*	*
<i>Portulaca pilosa</i>																										
<i>Portulaca sp.</i>																										
<i>Pterocaulon sphaeranthoides</i>					*				*	*	*	*		*	*	*	*			*	*			*	*	*
<i>Ptilotus aevoides</i>					*	*	*			*										*	*			*	*	*
<i>Ptilotus astrolasius</i>										*																
<i>Ptilotus auriculifolius</i>	*	*		*					*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Ptilotus axillaris</i>														*			*			*	*		*	*	*	*
<i>Ptilotus calostachyus</i>														*			*			*	*		*	*	*	*
<i>Ptilotus clementii</i>									*				*	*			*			*	*		*	*	*	*
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>			*				*	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Ptilotus fusiformis</i>									*				*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>																						*				*
<i>Ptilotus helipteroides</i>																										
<i>Ptilotus obovatus</i>	*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>										*			*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Ptilotus villosiflorus</i>																										
<i>Rhagodia eremaea</i>	*	*		*		*				*	*					*	*			*	*		*	*	*	*
<i>Rhodanthe margarethae</i>																	*									
<i>Rhynchosia minima</i>											*	*				*				*	*					
<i>Salsola tragus</i> subsp. <i>tragus</i>	*		*		*		*	*											*	*						
<i>Santalum lanceolatum</i>																										
<i>Sauropus crassifolius</i>													*			*	*	*	*	*	*	*	*	*	*	*
<i>Scaevola acacioides</i>																										
<i>Scaevola spinescens</i>		*																								
<i>Schizachyrium fragile</i>																										
<i>Sclerolaena costata</i>		*	*		*		*																			
<i>Sclerolaena densiflora</i>										*																
<i>Sclerolaena ericantha</i>										*																
<i>Senna artemisioides</i> subsp. <i>helmsii</i>			*		*														*							*
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>		*			*	*	*		*		*			*				*	*	*	*	*	*	*	*	*
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thin sericeous)			*					*								*										
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>				*	*	*		*		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>								*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>						*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>									*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>					*	*			*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Senna notabilis</i>											*	*				*			*	*			*	*	*	*

Species	1GP02	1GP03	1GP06	1GP10	1GPr01	1GPr04	1GPr08	1GPr12	1RA02	1RA03	1RA04	1RA05	1RA06	1RA07	1RA08	1RA09	1RA11	1RA12	1RA13	1RA14	1RA14b	1RA15	1RA16	1RA17	1RA18	1RA19	
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)			*					*																			
<i>Senna stricta</i>													*														
<i>Setaria verticillata</i>																											
<i>Sida</i> aff. <i>clementii</i>																											
<i>Sida</i> aff. <i>echinocarpa</i>										*			*							*				*		*	
<i>Sida</i> aff. <i>echinocarpa</i> (MET 15,350)																								*			
<i>Sida</i> aff. <i>echinocarpa</i> (WW 15-8)																								*			
<i>Sida</i> aff. <i>fibulifera</i>		*						*																			
<i>Sida</i> sp.									*																		
<i>Sida</i> sp. <i>Pilbara</i> (A.A Mitchell PRP 1543)																											
<i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90)								*																			
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)																											
<i>Sisymbrium orientale</i>																											
<i>Solanum ashbyae</i>																											
<i>Solanum ellipticum</i>																											
<i>Solanum ferocissimum</i>																											
<i>Solanum gabrielae</i>															*			*	*			*	*			*	
<i>Solanum horridum</i>																			*								
<i>Solanum lasiophyllum</i>			*														*		*		*	*	*	*	*	*	
<i>Solanum phlomoides</i>																											
<i>Solanum</i> sp.								*															*				
<i>Solanum sturtianum</i>																											
<i>Sonchus oleraceus</i>																											
<i>Sporobolus australasicus</i>		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Stemodia grossa</i>										*			*		*	*				*				*		*	
<i>Streptoglossa decurrens</i>																											
<i>Stylobasium spathulatum</i>											*	*				*	*				*	*	*				
<i>Swainsona complanata</i>																											
<i>Swainsona decurrens</i>																											
<i>Swainsona maccullochiana</i>																*											
<i>Tephrosia</i> aff. <i>clementii</i>								*																			
<i>Tephrosia</i> aff. <i>supina</i>									*																		
<i>Tephrosia densa</i>																											
<i>Tephrosia rosea</i> var. <i>glabrior</i>												*										*					
<i>Tephrosia rosea</i> var. <i>rosea</i>																											
<i>Themeda triandra</i>																*						*					
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>											*	*			*	*	*	*	*	*	*	*	*	*	*	*	
<i>Trachymene pilbarensis</i>													*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Trachymene</i> sp.									*												*						
<i>Tragus australianus</i>										*																	
<i>Trianthema glossostigma</i>																											
<i>Trianthema oxycalyptra</i> var. <i>oxycalyptra</i>																											
<i>Trianthema triquetra</i>			*		*			*																			
<i>Tribulus hirsutus</i>									*																		
<i>Tribulus suberosus</i>			*		*	*			*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Trichodesma zeylanicum</i> ?var.				*	*				*		*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>																				*							
<i>Triodia</i> ? <i>wiseana</i>																											
<i>Triodia angusta</i>										*	*			*		*				*	*	*	*	*	*	*	
<i>Triodia epactia</i>						*								*		*					*						
<i>Triodia wiseana</i>							*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Tripogon loliiformis</i>										*				*		*				*	*	*	*	*	*	*	
<i>Triumfetta clementii</i>						*			*				*			*		*						*		*	
<i>Triumfetta maconochieana</i>																											
<i>Vachellia farnesiana</i>																											
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>											*	*							*		*			*		*	

Species	1RA20	1RA21	1RA22	1RA23	1RA24	1RA25	1RA26	1RA27	1RA28	1RA29	1RA30	1RA31	1RA32	1RA33	1RA34	1RA35	1RA36	1RA37	1RA38	1RA40	1RA45	1RA46	1RAr10	2GPr01	2GPr02	2RA01	2RA02		
<i>Abutilon aff. lepidum</i> (4)										*											*								
<i>Abutilon dioicum</i>				*			*												*			*							
<i>Abutilon fraseri</i>																													
<i>Acacia aptaneura</i>	*	*	*	*	*	*	*	*			*						*					*					*		
<i>Acacia arida</i>									*	*									*	*		*							
<i>Acacia atkinsiana</i>																				*									
<i>Acacia bivenosa</i>												*	*			*													
<i>Acacia citrinoviridis</i>	*	*																	*			*						*	
<i>Acacia coriacea</i> subsp. <i>pendens</i>																													
<i>Acacia hamersleyensis</i>													*																
<i>Acacia inaequilatera</i>	*																												
<i>Acacia kempeana</i>	*								*					*						*								*	
<i>Acacia maitlandii</i>		*										*						*			*								
<i>Acacia marramamba</i>	*	*	*	*	*	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Acacia pruinocarpa</i>	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Acacia pyrifolia</i> ?var.																													
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>										*									*			*							
<i>Acacia rhodophloia</i>	*	*	*		*	*												*				*							
<i>Acacia spondylophylla</i>																	*				*								
<i>Acacia synchronica</i>		*				*	*	*							*	*	*				*		*	*	*	*	*	*	
<i>Acacia tetragonophylla</i>		*		*		*													*		*	*	*	*	*	*	*	*	
<i>Acacia wanyu</i>																													
<i>Acacia xiphophylla</i>						*	*	*																*			*		
<i>Acetosa vesicaria</i>																							*						
<i>Aerva javanica</i>				*																		*							
<i>Alternanthera nana</i>																													
<i>Alysicarpus muelleri</i>																													
<i>Amaranthus cuspidifolius</i>				*			*	*	*								*				*	*							
<i>Amaranthus interruptus</i>																													
<i>Amaranthus mitchellii</i>						*			*				*																
<i>Amaranthus undulatus</i>																													
<i>Ammannia multiflora</i>																													
<i>Amyema fitzgeraldii</i>	*	*			*	*	*																						
<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>																													
<i>Aristida contorta</i>	*			*		*		*	*	*		*				*		*	*	*	*	*	*	*	*	*	*	*	
<i>Astrotricha hamptonii</i>																													
<i>Bergia</i> sp.																													
<i>Bidens bipinnata</i>						*																*							
<i>Boerhavia coccinea</i>					*	*	*	*	*	*								*	*	*	*	*	*	*	*	*	*	*	
<i>Boerhavia gardneri</i>																											*		
<i>Boerhavia repleta</i>																													
<i>Boerhavia</i> sp.																													
<i>Bonamia media</i> var. <i>villosa</i>									*																				
<i>Brachyachne prostrata</i>																											*		
<i>Bulbostylis barbata</i>	*	*		*	*	*	*	*	*						*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Calandrinia schistorhiza</i>																												*	
<i>Calandrinia</i> sp.																													
<i>Capparis spinosa</i> var. <i>nummularia</i>																													
<i>Cenchrus ciliaris</i>				*		*		*	*	*					*				*			*	*	*	*	*	*	*	
<i>Cenchrus setiger</i>																						*	*	*	*	*	*	*	
<i>Centipeda minima</i> subsp. <i>macrocephala</i>																													
<i>Cheilanthes brownii</i>																													
<i>Cheilanthes lasiophylla</i>															*														
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>																													
<i>Chrysopogon fallax</i>																													
<i>Citrullus colocynthis</i>																													
<i>Cleome viscosa</i>			*	*	*	*	*	*	*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>												*																	
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>					*															*									
<i>Codonocarpus cotinifolius</i>													*																
<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>																						*							
<i>Convolvulus clementii</i>																													
<i>Corchorus crozophorifolius</i>					*	*					*									*		*	*	*	*	*	*	*	
<i>Corchorus laniflorus</i>									*	*				*						*		*	*	*	*	*	*	*	
<i>Corchorus lasiocarpus</i> ?subsp.	*																	*											
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>		*			*									*							*	*	*	*	*	*	*	*	
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>																													

Species	1RA20	1RA21	1RA22	1RA23	1RA24	1RA25	1RA26	1RA27	1RA28	1RA29	1RA30	1RA31	1RA32	1RA33	1RA34	1RA35	1RA36	1RA37	1RA38	1RA40	1RA45	1RA46	1RAr10	2GPr01	2GPr02	2RA01	2RA02	
<i>Corchorus</i> sp.																												
<i>Corchorus tridens</i>																							*				*	
<i>Corymbia ferriticola</i>					*																							
<i>Corymbia flavescens</i>					*																							
<i>Corymbia hamersleyana</i>										*									*	*			*					
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>										*									*	*			*					
<i>Cucumis maderaspatanus</i>	*	*	*	*	*	*	*	*	*	*		*	*	*	*					*	*	*	*	*			*	
<i>Cucumis melo</i> subsp. <i>agrestis</i>																												
<i>Cullen leucochaetes</i>																												
<i>Cymbopogon ambiguus</i>	*	*		*			*	*	*		*	*		*	*	*	*	*	*	*	*	*						
<i>Cymbopogon obtectus</i>		*				*													*									
<i>Cymbopogon</i> sp.																												
<i>Cynanchum floribundum</i>																												
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>			*		*				*							*												
<i>Cyperus vaginatus</i>																												
<i>Dactyloctenium radulans</i>																											*	
<i>Datura leichhardtii</i>										*																		
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>										*																		
<i>Dicladantha forrestii</i>																												
<i>Digitaria ctenantha</i>										*																		
<i>Dodonaea pachyneura</i>				*					*								*											
<i>Dodonaea petiolaris</i>		*		*	*	*		*																				
<i>Duperreya commixta</i>	*					*		*						*							*		*				*	
<i>Dysphania rhadinostachya</i> ?subsp.																			*		*							
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	*		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*					
<i>Dysphania</i> sp.																												
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>															*								*	*			*	
<i>Enneapogon caeruleus</i>	*	*		*			*		*		*								*	*			*	*			*	
<i>Enneapogon lindleyanus</i>					*	*	*		*					*					*	*		*	*				*	
<i>Enneapogon polyphyllus</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*				*	
<i>Enneapogon robustissimus</i>																												
<i>Eragrostis cumingii</i>																												
<i>Eragrostis eriopoda</i>																												
<i>Eragrostis pergracilis</i>																								*	*			
<i>Eragrostis</i> sp.																												
<i>Eragrostis tenellula</i>																												
<i>Eragrostis xerophila</i>																												
<i>Eremophila cryptothrix</i>	*	*		*	*	*	*	*							*	*												
<i>Eremophila cuneifolia</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Eremophila exilifolia</i>	*																											
<i>Eremophila forrestii</i> ?subsp.																						*						
<i>Eremophila fraseri</i> ?subsp.																												
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>		*																										
<i>Eremophila latrobei</i> ?subsp.													*	*														
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>																												
<i>Eremophila latrobei</i> subsp. <i>glabra</i>																		*			*							
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Eremophila longifolia</i>					*	*									*								*	*				
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>						*													*									
<i>Eremophila</i> sp.								*																				
<i>Eremophila tietkensis</i>												*																
<i>Eriachne aristidea</i>	*										*														*			
<i>Eriachne mucronata</i>				*							*				*									*				
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Eriachne mucronata</i> (typical form)				*							*				*							*					*	
<i>Eriachne pulchella</i> ?subsp.												*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>		*									*				*							*						
<i>Eriachne</i> sp.																												
<i>Eriachne tenuiculmis</i>																												
<i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i>																												
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>											*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Eucalyptus victrix</i>																												
<i>Eucalyptus xerothermica</i>																												
<i>Euphorbia alsiniflora</i>																												
<i>Euphorbia australis</i>									*									*									*	
<i>Euphorbia biconvexa</i>																												

Species	1RA20	1RA21	1RA22	1RA23	1RA24	1RA25	1RA26	1RA27	1RA28	1RA29	1RA30	1RA31	1RA32	1RA33	1RA34	1RA35	1RA36	1RA37	1RA38	1RA40	1RA45	1RA46	1RAr10	2GPr01	2GPr02	2RA01	2RA02		
<i>Euphorbia boophthona</i>															*	*													
<i>Euphorbia boophthona/tannensis</i>														*															
<i>Euphorbia hirta</i>																													
<i>Euphorbia schultzei</i>	*						*		*														*						
<i>Euphorbia</i> sp.																													
<i>Euphorbia</i> sp. (PAN5-15)										*																			
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>										*			*		*						*	*						*	
<i>Euphorbia wheeleri</i>										*																			
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>				*		*		*	*	*	*								*			*						*	
<i>Ficus brachypoda</i>																													
<i>Flaveria trinervia</i>																													
<i>Glinus lotoides</i>																													
<i>Glycine canescens</i>																													
<i>Gomphrena canescens</i> subsp. <i>canescens</i>																													
<i>Gomphrena cunninghamii</i>	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*						
<i>Gomphrena kanisii</i>			*		*				*									*		*									
<i>Gomphrena</i> sp.																													
<i>Goodenia forrestii</i>																													
<i>Goodenia microptera</i>	*		*	*					*									*	*				*						
<i>Goodenia muelleriana</i>				*		*																	*						
<i>Goodenia</i> sp.										*																			
<i>Goodenia stobbsiana</i>					*																								
<i>Goodenia tenuiloba</i>						*																*							
<i>Gossypium australe</i>																												*	
<i>Gossypium australe</i> (Burrup Peninsula form)																													
<i>Gossypium australe</i> (Whim Creek form)																							*						
<i>Gossypium robinsonii</i>																													
<i>Grevillea berryana</i>	*	*		*	*						*					*	*					*	*						
<i>Hakea chordophylla</i>																													
<i>Hakea lorea</i> subsp. <i>lorea</i>																													
<i>Harnieria kempeana</i> subsp. <i>muelleri</i>																													
<i>Helichrysum luteoalbum</i>																													
<i>Heliotropium heteranthum</i>																													
<i>Heliotropium inexplicitum</i>																			*	*									
<i>Hibiscus</i> aff. <i>coatesii</i>		*		*					*										*	*		*							
<i>Hibiscus burtonii</i>																													
<i>Hibiscus coatesii</i>					*				*											*									
<i>Hibiscus gardneri</i>																			*										
<i>Hibiscus haynaldii</i>																													
<i>Hibiscus sturtii</i> var. <i>platychlamy</i>																										*			
<i>Hybanthus aurantiacus</i>			*	*					*										*			*	*					*	
<i>Indigofera colutea</i>																													
<i>Indigofera monophylla</i>											*			*					*	*			*						
<i>Ipomoea muelleri</i>																													
<i>Iseilema dolichotrichum</i>										*												*							
<i>Iseilema eremaeum</i>									*	*									*	*									
<i>Iseilema membranaceum</i>						*																					*		
<i>Jasminum didymum</i> subsp. <i>lineare</i>	*			*		*						*					*												
<i>Keraudrenia nephrosperma</i>				*																									
<i>Lepidium oxytrichum</i>																													
<i>Lepidium pedicellosum</i>						*	*	*										*											
<i>Lepidium platypetalum</i>																													
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh																			*	*									
<i>Maireana</i> ? <i>georgei</i>		*				*									*	*													
<i>Maireana</i> ? <i>triptera</i>							*																						
<i>Maireana georgei</i>			*				*									*													
<i>Maireana melanocoma</i>						*									*						*						*		
<i>Maireana planifolia</i>						*								*															
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>						*			*																				
<i>Maireana villosa</i>			*			*			*																				
<i>Malvastrum americanum</i>																													
<i>Marsdenia australis</i>															*														
<i>Melaleuca glomerata</i>																													
<i>Melaleuca lasiandra</i>																											*		
<i>Melhania oblongifolia</i>																											*		
<i>Mollugo molluginea</i>	*			*	*		*	*	*		*				*	*		*	*	*	*	*	*				*	*	
<i>Nicotiana ?umbratica</i>						*																							



Species	1RA20	1RA21	1RA22	1RA23	1RA24	1RA25	1RA26	1RA27	1RA28	1RA29	1RA30	1RA31	1RA32	1RA33	1RA34	1RA35	1RA36	1RA37	1RA38	1RA40	1RA45	1RA46	1RAr10	2GPr01	2GPr02	2RA01	2RA02		
<i>Nicotiana benthamiana</i>															*														
<i>Nicotiana occidentalis</i> ?subsp.						*									*	*													
<i>Nicotiana occidentalis</i> subsp. <i>obliqua</i>																													
<i>Nicotiana occidentalis</i> subsp. <i>occidentalis</i>																													
<i>Nicotiana</i> sp.																													
<i>Nicotiana umbratica</i>																													
<i>Notoleptopus decaisnei</i> var. <i>Orbicularis</i>		*		*	*	*	*	*	*	*									*		*	*						*	
<i>Oldenlandia crouchiana</i>	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*					
<i>Operculina aequisejala</i>																													
<i>Paraneurachne muelleri</i>																			*	*									
<i>Paspalidium clementii</i>	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*						
<i>Peripleura arida</i>															*														
<i>Perotis rara</i>						*																							
<i>Petalostylis labicheoides</i>																													
<i>Phyllanthus erwinii</i>																				*									
<i>Phyllanthus maderaspatensis</i>																							*						
<i>Phyllanthus</i> sp.																													
<i>Pluchea dentex</i>																													
<i>Pluchea rubelliflora</i>																													
<i>Pluchea</i> sp.																													
<i>Plumbago zeylanica</i>																													
<i>Polycarpaea corymbosa</i>	*			*						*																	*		
<i>Polycarpaea holtzei</i>										*										*									
<i>Polycarpaea longiflora</i>	*	*		*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*					*
<i>Polygala isingii</i>																													
<i>Polymeria longifolia</i>																													
<i>Portulaca oleracea</i>				*						*			*						*	*		*	*						*
<i>Portulaca pilosa</i>					*					*																			
<i>Portulaca</i> sp.																													
<i>Pterocaulon sphacelatum</i>				*	*		*	*	*	*	*			*		*		*	*	*	*	*	*						
<i>Pterocaulon sphaeranthoides</i>				*	*		*	*	*	*	*			*		*		*	*	*	*	*	*						
<i>Ptilotus aervooides</i>									*											*								*	
<i>Ptilotus astrolasius</i>		*																											
<i>Ptilotus auriculifolius</i>	*		*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*				*	*	
<i>Ptilotus axillaris</i>											*																		
<i>Ptilotus calostachyus</i>	*			*	*	*	*	*												*							*		
<i>Ptilotus clementii</i>	*			*	*					*		*	*			*	*		*	*	*	*			*				
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	*		*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*			*			
<i>Ptilotus fusiformis</i>	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*						
<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>				*															*	*									
<i>Ptilotus helipteroides</i>																													
<i>Ptilotus obovatus</i>	*	*		*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*				*	*
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	*		*	*	*	*	*	*	*	*		*							*		*	*	*						
<i>Ptilotus villosiflorus</i>																													
<i>Rhagodia eremaea</i>						*		*															*						*
<i>Rhodanthe margarethae</i>																													
<i>Rhynchosia minima</i>									*										*		*	*							
<i>Salsola tragus</i> subsp. <i>tragus</i>																								*	*				
<i>Santalum lanceolatum</i>																								*					
<i>Sauropus crassifolius</i>																													
<i>Scaevola acacioides</i>	*	*				*	*					*	*		*	*	*		*		*								
<i>Scaevola spinescens</i>																											*		
<i>Schizachyrium fragile</i>																*		*											
<i>Sclerolaena costata</i>						*																		*	*				
<i>Sclerolaena densiflora</i>																							*					*	
<i>Sclerolaena eriantha</i>																													
<i>Senna artemisioides</i> subsp. <i>helmsii</i>			*			*			*	*	*	*	*						*	*	*	*	*						
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>		*				*			*	*	*	*	*	*				*	*	*	*	*	*	*		*		*	
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thinly sericeous)									*	*	*	*	*	*					*	*	*	*	*	*		*		*	
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>									*	*	*	*	*	*					*	*	*	*	*	*		*		*	
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>						*	*		*	*									*	*	*	*	*	*	*	*	*	*	
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>								*	*	*	*	*	*	*					*	*	*	*	*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>		*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Senna notabilis</i>				*	*									*														*	*
<i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26)														*									*						
<i>Senna stricta</i>							*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Species	1RA20	1RA21	1RA22	1RA23	1RA24	1RA25	1RA26	1RA27	1RA28	1RA29	1RA30	1RA31	1RA32	1RA33	1RA34	1RA35	1RA36	1RA37	1RA38	1RA40	1RA45	1RA46	1RAr10	2GPr01	2GPr02	2RA01	2RA02	
<i>Setaria verticillata</i>							*																					
<i>Sida</i> aff. <i>clementii</i>		*	*	*	*	*			*	*												*						
<i>Sida</i> aff. <i>echinocarpa</i>					*															*								
<i>Sida</i> aff. <i>echinocarpa</i> (MET 15,350)										*									*									
<i>Sida</i> aff. <i>echinocarpa</i> (WW 15-8)																		*				*						
<i>Sida</i> aff. <i>fibulifera</i>																												
<i>Sida</i> sp.																												
<i>Sida</i> sp. <i>Pilbara</i> (A.A Mitchell PRP 1543)													*															
<i>Sida</i> sp. spiciform panicles (E. Leyland s.n. 14/8/90)			*																*		*							
<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)																												
<i>Sisymbrium orientale</i>																					*		*					
<i>Solanum ashbyae</i>			*																	*		*						
<i>Solanum ellipticum</i>									*																			
<i>Solanum ferocissimum</i>														*														
<i>Solanum gabriellae</i>	*			*	*								*		*	*			*		*							
<i>Solanum horridum</i>	*				*	*			*				*	*	*	*			*	*	*	*						
<i>Solanum lasiophyllum</i>		*		*	*	*			*	*	*		*	*	*	*			*	*	*	*	*	*	*	*	*	*
<i>Solanum phlomoides</i>																												
<i>Solanum</i> sp.														*														
<i>Solanum sturtianum</i>																												
<i>Sonchus oleraceus</i>																												
<i>Sporobolus australasicus</i>		*		*			*		*	*						*		*	*	*	*	*	*	*	*	*	*	*
<i>Stemodia grossa</i>					*			*	*	*				*								*						
<i>Streptoglossa decurrens</i>		*								*																		
<i>Stylobasium spathulatum</i>											*	*		*									*					
<i>Swainsona complanata</i>				*																								
<i>Swainsona decurrens</i>									*																			
<i>Swainsona maccullochiana</i>																					*							
<i>Tephrosia</i> aff. <i>clementii</i>																												
<i>Tephrosia</i> aff. <i>supina</i>																												
<i>Tephrosia densa</i>									*																			
<i>Tephrosia rosea</i> var. <i>glabrior</i>									*																			
<i>Tephrosia rosea</i> var. <i>rosea</i>									*																			
<i>Themeda triandra</i>									*																			
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	*	*	*	*	*	*			*	*	*	*	*		*	*		*	*	*	*	*	*	*	*	*	*	*
<i>Trachymene pilbarensis</i>	*	*	*	*	*	*		*	*	*	*	*	*		*	*		*	*	*	*	*	*	*	*	*	*	*
<i>Trachymene</i> sp.									*											*	*	*	*	*	*	*	*	*
<i>Tragus australianus</i>																											*	*
<i>Trianthema glossostigma</i>																												
<i>Trianthema oxycalypta</i> var. <i>oxycalypta</i>																								*	*	*	*	*
<i>Trianthema triquetra</i>																												
<i>Tribulus hirsutus</i>																					*	*	*	*	*	*	*	*
<i>Tribulus suberosus</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Trichodesma zeylanicum</i> ?var.			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	*										*																	
<i>Triodia</i> ? <i>wiseana</i>																											*	*
<i>Triodia angusta</i>		*			*										*								*					
<i>Triodia epactia</i>																												
<i>Triodia wiseana</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Tripogon loliiformis</i>					*								*														*	*
<i>Triumfetta clementii</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Triumfetta maconochieana</i>	*																											
<i>Vachellia farnesiana</i>																												
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>									*					*														

Species	2RA05	2RA07	2RA08	2RA10	2RA1	2RA12	2RA13	2RA17	2RA18	2RA19	2RA22	2RAr03	2RAr04	2RAr06	2RAr09	2RAr14	2RAr15	2RAr16	2RAr20	2RAr21	3RAr01	3RAr02	3RAr03	3RAr04	6RAr01	RAOPP
<i>Abutilon aff. lepidum</i> (4)		*	*	*										*												
<i>Abutilon dioicum</i>						*			*	*	*									*						
<i>Abutilon fraseri</i>																			*							
<i>Acacia aptaneura</i>					*		*					*	*					*	*	*						
<i>Acacia arida</i>		*	*	*	*	*	*	*		*	*			*			*	*			*					
<i>Acacia atkinsiana</i>																										
<i>Acacia bivenosa</i>						*	*			*						*	*						*			
<i>Acacia citrinoviridis</i>	*				*				*	*		*	*		*	*	*	*	*	*	*		*			
<i>Acacia coriacea</i> subsp. <i>pendens</i>	*				*				*	*					*	*	*	*	*	*						
<i>Acacia hamersleyensis</i>																						*				
<i>Acacia inaequilatera</i>													*													
<i>Acacia kempeana</i>					*	*						*	*										*			
<i>Acacia maitlandii</i>									*													*	*			
<i>Acacia marramamba</i>																						*	*			
<i>Acacia pruinocarpa</i>					*	*				*	*		*	*			*	*	*	*	*	*	*	*	*	*
<i>Acacia pyrifolia</i> ?var.																			*	*						
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>					*	*		*		*		*			*			*	*	*	*					
<i>Acacia rhodophloia</i>																									*	
<i>Acacia spondylophylla</i>																								*		
<i>Acacia synchronicia</i>	*		*			*	*				*		*						*	*	*	*	*	*	*	*
<i>Acacia tetragonophylla</i>		*		*	*	*	*		*	*	*	*	*	*	*				*	*	*	*	*	*	*	*
<i>Acacia wanyu</i>																										
<i>Acacia xiphophylla</i>																										*
<i>Acetosa vesicaria</i>	*	*										*			*											
<i>Aerva javanica</i>	*	*	*		*		*		*						*				*	*	*	*	*	*	*	*
<i>Alternanthera nana</i>	*																									
<i>Alysicarpus muelleri</i>																										
<i>Amaranthus cuspidifolius</i>		*		*		*					*	*		*				*	*	*						
<i>Amaranthus interruptus</i>																										
<i>Amaranthus mitchellii</i>										*						*						*				
<i>Amaranthus undulatus</i>	*								*													*				
<i>Ammannia multiflora</i>	*																									
<i>Amyema fitzgeraldii</i>																										
<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>	*																									
<i>Aristida contorta</i>		*	*			*		*						*					*	*	*					
<i>Astrotricha hamptonii</i>																								*		
<i>Bergia</i> sp.	*																									
<i>Bidens bipinnata</i>			*						*	*						*	*	*	*	*	*					
<i>Boerhavia coccinea</i>			*		*			*	*	*	*		*	*			*	*	*	*	*					*
<i>Boerhavia gardneri</i>		*					*		*	*		*					*	*	*	*	*					
<i>Boerhavia repleta</i>	*																									
<i>Boerhavia</i> sp.																*										
<i>Bonamia media</i> var. <i>villosa</i>				*	*		*					*														
<i>Brachyachne prostrata</i>																										*
<i>Bulbostylis barbata</i>		*						*						*					*	*	*	*	*	*	*	*
<i>Calandrinia schistorhiza</i>																										
<i>Calandrinia</i> sp.																										
<i>Capparis spinosa</i> var. <i>nummularia</i>										*												*				
<i>Cenchrus ciliaris</i>	*	*	*		*			*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Cenchrus setiger</i>	*				*							*	*		*	*	*	*	*	*	*	*	*	*	*	*
<i>Centipeda minima</i> subsp. <i>macrocephala</i>	*																									
<i>Cheilanthes brownii</i>																										
<i>Cheilanthes lasiophylla</i>										*								*								
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>																										
<i>Chrysopogon fallax</i>																										
<i>Citrullus colocynthis</i>	*				*								*		*		*		*	*	*	*	*	*	*	*
<i>Cleome viscosa</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>										*									*	*	*	*	*	*	*	*
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>									*								*	*	*	*	*	*	*	*	*	*
<i>Codonocarpus cotinifolius</i>																										
<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>	*											*														
<i>Convolvulus clementii</i>									*	*						*	*	*	*	*	*	*	*	*	*	*
<i>Corchorus crozophorifolius</i>		*	*	*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Corchorus laniflorus</i>								*						*		*	*	*	*	*	*	*	*	*	*	*
<i>Corchorus lasiocarpus</i> ?subsp.																*										*
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>		*	*	*			*				*							*	*	*	*	*	*	*	*	*
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>																										

Species	2RA05	2RA07	2RA08	2RA10	2RA1	2RA12	2RA13	2RA17	2RA18	2RA19	2RA22	2RAr03	2RAr04	2RAr06	2RAr09	2RAr14	2RAr15	2RAr16	2RAr20	2RAr21	3RAr01	3RAr02	3RAr03	3RAr04	6RAr01	RAOPP	
<i>Corchorus</i> sp.									*																		
<i>Corchorus tridens</i>	*		*		*				*			*					*		*	*							
<i>Corymbia ferriticola</i>																					*			*			
<i>Corymbia flavescens</i>																											
<i>Corymbia hamersleyana</i>																										*	
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>		*		*	*		*	*	*	*	*	*				*	*		*	*							
<i>Cucumis maderaspatanus</i>	*	*	*	*	*		*		*	*	*	*		*	*	*	*	*	*	*		*		*	*	*	
<i>Cucumis melo</i> subsp. <i>agrestis</i>	*																									*	
<i>Cullen leucochaetes</i>																										*	
<i>Cymbopogon ambiguus</i>		*				*			*	*	*	*				*	*		*	*		*		*			
<i>Cymbopogon obtectus</i>																		*									
<i>Cymbopogon</i> sp.				*																							
<i>Cynanchum floribundum</i>																											
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>																					*		*				
<i>Cyperus vaginatus</i>	*																*										
<i>Dactyloctenium radulans</i>			*																								
<i>Datura leichardtii</i>																											
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>																											
<i>Dicladantha forrestii</i>												*															
<i>Digitaria ctenantha</i>																											
<i>Dodonaea pachyneura</i>																						*		*			
<i>Dodonaea petiolaris</i>																											
<i>Duperreya commixta</i>	*	*			*				*			*			*	*			*	*		*					
<i>Dysphania rhadinostachya</i> ?subsp.		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*							
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	
<i>Dysphania</i> sp.											*		*		*						*						
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>							*																		*		
<i>Enneapogon caeruleus</i>			*	*				*																			
<i>Enneapogon lindleyanus</i>							*		*		*									*							
<i>Enneapogon polyphyllus</i>	*		*	*				*	*		*	*		*				*	*	*		*			*	*	
<i>Enneapogon robustissimus</i>								*																			
<i>Eragrostis cumingii</i>																											
<i>Eragrostis eriopoda</i>																											
<i>Eragrostis pergracilis</i>																											
<i>Eragrostis</i> sp.																											
<i>Eragrostis tenellula</i>	*																*									*	
<i>Eragrostis xerophila</i>													*														
<i>Eremophila cryptothrix</i>																					*						
<i>Eremophila cuneifolia</i>		*	*	*		*	*	*		*	*	*	*	*											*	*	
<i>Eremophila exilifolia</i>																											
<i>Eremophila forrestii</i> ?subsp.																											
<i>Eremophila fraseri</i> ?subsp.								*																			
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>																										*	
<i>Eremophila latrobei</i> ?subsp.																					*						
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>																											
<i>Eremophila latrobei</i> subsp. <i>glabra</i>																											
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>																						*		*			
<i>Eremophila longifolia</i>						*	*		*	*						*	*	*	*			*		*		*	
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>											*														*	*	
<i>Eremophila</i> sp.																											
<i>Eremophila tietkensis</i>																											
<i>Eriachne aristidea</i>																											
<i>Eriachne mucronata</i>									*													*	*			*	
<i>Eriachne mucronata</i> (arid form) (MET 12 736)		*							*												*	*	*	*		*	
<i>Eriachne mucronata</i> (typical form)												*							*		*	*	*	*		*	
<i>Eriachne pulchella</i> ?subsp.	*														*										*		
<i>Eriachne pulchella</i> subsp. <i>dominii</i>				*				*															*	*		*	
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>													*														
<i>Eriachne</i> sp.					*																						
<i>Eriachne tenuiculmis</i>																				*							
<i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i>	*																										
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>																	*				*	*					
<i>Eucalyptus victrix</i>	*															*											
<i>Eucalyptus xerothermica</i>																											
<i>Euphorbia alsiniflora</i>									*																		
<i>Euphorbia australis</i>					*	*		*								*	*		*	*							
<i>Euphorbia biconvexa</i>	*				*														*	*							

Species	2RA05	2RA07	2RA08	2RA10	2RA1	2RA12	2RA13	2RA17	2RA18	2RA19	2RA22	2RAr03	2RAr04	2RAr06	2RAr09	2RAr14	2RAr15	2RAr16	2RAr20	2RAr21	3RAr01	3RAr02	3RAr03	3RAr04	6RAr01	RAOPP	
<i>Euphorbia boophthona</i>											*																
<i>Euphorbia boophthona/tannensis</i>																											
<i>Euphorbia hirta</i>	*														*												
<i>Euphorbia schultzei</i>			*						*					*					*								
<i>Euphorbia sp.</i>																											
<i>Euphorbia sp. (PAN5-15)</i>																											
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>				*						*				*		*			*	*							
<i>Euphorbia wheeleri</i>																											
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>		*	*	*			*		*	*		*		*					*								
<i>Ficus brachypoda</i>																								*			
<i>Flaveria trinervia</i>							*		*			*				*			*								
<i>Glinus lotoides</i>																										*	
<i>Glycine canescens</i>																	*		*								
<i>Gomphrena canescens</i> subsp. <i>canescens</i>							*																				
<i>Gomphrena cunninghamii</i>		*	*	*	*	*	*	*	*	*	*			*				*	*	*		*	*	*			
<i>Gomphrena kanisii</i>				*							*																
<i>Gomphrena sp.</i>																											
<i>Goodenia forrestii</i>													*		*												
<i>Goodenia microptera</i>		*	*																								
<i>Goodenia muelleriana</i>		*	*								*																
<i>Goodenia sp.</i>																											
<i>Goodenia stobbsiana</i>													*														
<i>Goodenia tenuiloba</i>																											
<i>Gossypium australe</i>											*																
<i>Gossypium australe</i> (Burrup Peninsula form)																											
<i>Gossypium australe</i> (Whim Creek form)						*											*		*								
<i>Gossypium robinsonii</i>																											
<i>Grevillea berryana</i>					*								*		*									*			
<i>Hakea chordophylla</i>										*																	
<i>Hakea lorea</i> subsp. <i>lorea</i>													*														
<i>Harnieria kempeana</i> subsp. <i>muelleri</i>																										*	
<i>Helichrysum luteoalbum</i>																	*										
<i>Heliotropium heteranthum</i>																											
<i>Heliotropium inexplicitum</i>								*			*			*													
<i>Hibiscus aff. coatesii</i>				*			*				*							*				*					
<i>Hibiscus burtonii</i>																											
<i>Hibiscus coatesii</i>								*																			
<i>Hibiscus gardneri</i>																											
<i>Hibiscus haynaldii</i>																			*								
<i>Hibiscus sturtii</i> var. <i>platychlamyd</i>																											
<i>Hybanthus aurantiacus</i>		*		*	*	*			*			*			*			*	*	*	*	*	*	*			
<i>Indigofera colutea</i>																											
<i>Indigofera monophylla</i>								*	*			*			*	*				*							
<i>Ipomoea muelleri</i>	*																										
<i>Iseilema dolichotrichum</i>																											
<i>Iseilema eremaeum</i>			*					*						*													
<i>Iseilema membranaceum</i>		*		*																							
<i>Jasminum didymum</i> subsp. <i>lineare</i>	*				*			*	*						*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Keraudrenia nephrosperma</i>																											
<i>Lepidium oxytrichum</i>										*																	
<i>Lepidium pedicellosum</i>																											
<i>Lepidium platypetalum</i>																											
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh										*						*	*	*	*	*		*					
<i>Maireana ? georgei</i>																											
<i>Maireana ? triptera</i>																											
<i>Maireana georgei</i>																						*					
<i>Maireana melanocoma</i>																											
<i>Maireana planifolia</i>																											
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>																											
<i>Maireana villosa</i>																											
<i>Malvastrum americanum</i>	*																*		*								
<i>Marsdenia australis</i>																											
<i>Melaleuca glomerata</i>	*								*							*	*										
<i>Melaleuca lasiandra</i>																											
<i>Melhania oblongifolia</i>												*					*										
<i>Mollugo molluginea</i>		*	*	*	*				*			*		*						*						*	
<i>Nicotiana ?umbratica</i>																											

Species	2RA05	2RA07	2RA08	2RA10	2RA1	2RA12	2RA13	2RA17	2RA18	2RA19	2RA22	2RAr03	2RAr04	2RAr06	2RAr09	2RAr14	2RAr15	2RAr16	2RAr20	2RAr21	3RAr01	3RAr02	3RAr03	3RAr04	6RAr01	RAOPP	
<i>Nicotiana benthamiana</i>																		*				*					
<i>Nicotiana occidentalis</i> ?subsp.						*			*								*										
<i>Nicotiana occidentalis</i> subsp. <i>obliqua</i>										*																	
<i>Nicotiana occidentalis</i> subsp. <i>occidentalis</i>																											
<i>Nicotiana</i> sp.																				*				*			
<i>Nicotiana umbratica</i>										*									*								
<i>Notoleptopus decaisnei</i> var. <i>Orbicularis</i>	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*						
<i>Oldenlandia crouchiana</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*			
<i>Operculina aequisejala</i>																											
<i>Paraneurachne muelleri</i>																											
<i>Paspalidium clementii</i>		*	*	*			*	*	*		*			*		*		*	*	*	*	*	*	*	*		
<i>Peripleura arida</i>									*		*									*						*	
<i>Perotis rara</i>																											
<i>Petalostylis labicheoides</i>	*												*		*	*			*								
<i>Phyllanthus erwinii</i>												*															
<i>Phyllanthus maderaspatensis</i>																*	*		*				*				
<i>Phyllanthus</i> sp.																											
<i>Pluchea dentex</i>																											
<i>Pluchea rubelliflora</i>	*								*								*										
<i>Pluchea</i> sp.	*								*																		
<i>Plumbago zeylanica</i>	*														*												
<i>Polycarpaea corymbosa</i>									*			*												*			
<i>Polycarpaea holtzei</i>																										*	
<i>Polycarpaea longiflora</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Polygala isingii</i>									*																		
<i>Polymeria longifolia</i>																											
<i>Portulaca oleracea</i>		*	*									*	*													*	
<i>Portulaca pilosa</i>																											
<i>Portulaca</i> sp.									*																		
<i>Pterocaulon sphacelatum</i>																		*									
<i>Pterocaulon sphaeranthoides</i>	*		*	*			*		*	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	
<i>Ptilotus aevoides</i>																											
<i>Ptilotus astrolasius</i>																											
<i>Ptilotus auriculifolius</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Ptilotus axillaris</i>											*																
<i>Ptilotus calostachyus</i>											*																
<i>Ptilotus clementii</i>		*	*											*										*			
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>						*	*	*															*		*		
<i>Ptilotus fusiformis</i>		*	*							*				*								*	*	*			
<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>																						*	*	*			
<i>Ptilotus helipteroides</i>																										*	
<i>Ptilotus obovatus</i>		*			*	*	*				*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>	*																								*		
<i>Ptilotus villosiflorus</i>														*													
<i>Rhagodia eremaea</i>					*										*			*							*	*	
<i>Rhodanthe margarethae</i>																		*									
<i>Rhynchosia minima</i>			*	*				*	*			*			*	*	*	*	*	*	*	*	*	*	*	*	
<i>Salsola tragus</i> subsp. <i>tragus</i>			*													*											
<i>Santalum lanceolatum</i>										*							*										
<i>Sauropus crassifolius</i>																								*			
<i>Scaevola acacioides</i>						*										*						*	*				
<i>Scaevola spinescens</i>																	*										
<i>Schizachyrium fragile</i>																											
<i>Sclerolaena costata</i>																											
<i>Sclerolaena densiflora</i>																									*		
<i>Sclerolaena eriantha</i>																									*		
<i>Senna artemisioides</i> subsp. <i>helmsii</i>				*			*	*	*					*		*							*		*		
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thinly sericeous)													*												*		
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>						*	*		*	*	*							*							*		
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>																				*							
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Senna notabilis</i>		*	*	*												*				*	*	*	*	*	*	*	
<i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26)																											
<i>Senna stricta</i>							*				*						*								*		

Species	2RA05	2RA07	2RA08	2RA10	2RA1	2RA12	2RA13	2RA17	2RA18	2RA19	2RA22	2RAr03	2RAr04	2RAr06	2RAr09	2RAr14	2RAr15	2RAr16	2RAr20	2RAr21	3RAr01	3RAr02	3RAr03	3RAr04	6RAr01	RAOPP
<i>Setaria verticillata</i>									*								*									
<i>Sida aff. clementii</i>																										
<i>Sida aff. echinocarpa</i>			*																							
<i>Sida aff. echinocarpa</i> (MET 15,350)																										
<i>Sida aff. echinocarpa</i> (WW 15-8)																										
<i>Sida aff. fibulifera</i>																										
<i>Sida</i> sp.																										
<i>Sida</i> sp. <i>Pilbara</i> (A.A Mitchell PRP 1543)																										
<i>Sida</i> sp. <i>spiciform panicles</i> (E. Leyland s.n. 14/8/90)		*									*							*								
<i>Sida</i> sp. <i>verrucose glands</i> (F.H. Mollemans 2423)	*			*																						
<i>Sisymbrium orientale</i>	*																									
<i>Solanum ashbyae</i>																						*				
<i>Solanum ellipticum</i>				*																			*			
<i>Solanum ferocissimum</i>																										
<i>Solanum gabriellae</i>			*			*																	*	*		
<i>Solanum horridum</i>										*																
<i>Solanum lasiophyllum</i>																										
<i>Solanum phlomoides</i>																										*
<i>Solanum</i> sp.																						*				
<i>Solanum sturtianum</i>					*							*			*											
<i>Sonchus oleraceus</i>	*																*									
<i>Sporobolus australasicus</i>	*	*	*		*	*	*	*		*		*	*	*	*				*				*			*
<i>Stemodia grossa</i>	*						*		*			*						*					*			
<i>Streptoglossa decurrens</i>											*						*		*							
<i>Stylobasium spathulatum</i>																*	*					*		*		
<i>Swainsona complanata</i>																										*
<i>Swainsona decurrens</i>			*																							*
<i>Swainsona maccullochiana</i>		*							*	*				*			*	*	*							*
<i>Tephrosia aff. clementii</i>																										*
<i>Tephrosia aff. supina</i>											*															*
<i>Tephrosia densa</i>				*					*	*		*		*							*					*
<i>Tephrosia rosea</i> var. <i>glabrior</i>									*							*	*		*							*
<i>Tephrosia rosea</i> var. <i>rosea</i>									*										*							*
<i>Themeda triandra</i>						*			*	*		*							*	*						*
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>						*	*	*	*	*	*					*		*	*	*		*		*		*
<i>Trachymene pilbarensis</i>			*				*		*	*				*			*	*	*			*				*
<i>Trachymene</i> sp.		*		*	*							*														
<i>Tragus australianus</i>																										*
<i>Trianthema glossostigma</i>																										*
<i>Trianthema oxycalyptra</i> var. <i>oxycalyptra</i>																										*
<i>Trianthema triquetra</i>			*																							*
<i>Tribulus hirsutus</i>								*			*															
<i>Tribulus suberosus</i>		*	*			*	*	*	*	*	*			*				*	*	*	*	*	*	*	*	*
<i>Trichodesma zeylanicum</i> ?var.	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>																										
<i>Triodia ? wiseana</i>																										
<i>Triodia angusta</i>																*										
<i>Triodia epactia</i>																										
<i>Triodia wiseana</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Tripogon loliformis</i>								*																		
<i>Triumfetta clementii</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Triumfetta maconochieana</i>																		*	*	*				*	*	*
<i>Vachellia farnesiana</i>	*												*													
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>																										

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## **Appendix P: Vegetation Association by Species Matrix**

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Table P.1: Phase 1 and Phase 2 Vegetation Association by Species Matrix.

Name	Hills and Breakaways									Plains			Major Drainage			Minor Drainage				
	Hi03	Hi04	Hi08	Hi09	Hi14	Hi16	Hi19	Hi22	HBr4	Pl08	Pl10	Pl11	Ma01	Ma03	Ma04	Mi02	Mi06	Mi08	Mi15	mDr32
<i>Abutilon aff. lepidum</i> (4)									*											
<i>Abutilon dioicum</i>	*	*	*	*				*	*	*				*		*		*		
<i>Abutilon fraseri</i>														*		*				
<i>Acacia aptaneura</i>	*	*	*	*	*	*	*	*	*	*	*					*	*	*	*	*
<i>Acacia arida</i>	*	*							*		*				*	*				
<i>Acacia atkinsiana</i>									*											
<i>Acacia bivenosa</i>	*	*	*			*		*	*					*	*	*				
<i>Acacia citrinoviridis</i>	*			*	*			*	*		*		*	*	*	*	*	*	*	*
<i>Acacia coriacea</i> subsp. <i>pendens</i>		*									*		*	*	*	*	*			
<i>Acacia hamersleyensis</i>						*		*												
<i>Acacia inaequilatera</i>				*			*	*												*
<i>Acacia kempeana</i>	*			*		*	*	*	*		*	*					*	*	*	*
<i>Acacia maitlandii</i>					*	*	*	*								*				
<i>Acacia marramamba</i>	*		*	*	*	*	*	*												
<i>Acacia pruinocarpa</i>	*	*	*	*	*	*	*	*	*		*				*	*	*	*		*
<i>Acacia pyrifolia</i> ?var.														*		*				
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	*	*							*		*			*		*	*			
<i>Acacia rhodophloia</i>			*	*	*		*	*												
<i>Acacia spondylophylla</i>							*	*												
<i>Acacia synchronica</i>	*	*	*		*			*	*	*	*	*	*	*		*	*	*	*	*
<i>Acacia tetragonophylla</i>	*	*	*	*	*			*	*	*	*	*	*	*		*	*	*	*	*
<i>Acacia wanyu</i>											*									*
<i>Acacia xiphophylla</i>	*		*					*	*	*	*	*								
<i>Acetosa vesicaria</i>									*				*	*				*		*
<i>Aerva javanica</i>			*	*					*	*	*	*	*	*		*	*	*		
<i>Alternanthera nana</i>													*							
<i>Alysicarpus muelleri</i>																				*
<i>Amaranthus cuspidifolius</i>	*	*	*	*				*	*	*				*		*		*		
<i>Amaranthus interruptus</i>								*												
<i>Amaranthus mitchellii</i>		*	*			*		*	*					*						
<i>Amaranthus undulatus</i>								*					*			*				
<i>Ammannia multiflora</i>													*							
<i>Amyema fitzgeraldii</i>			*	*	*					*										
<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>													*							
<i>Aristida contorta</i>			*	*		*		*	*	*	*	*						*		*
<i>Astrotricha hamptonii</i>								*												
<i>Bergia</i> sp.													*							
<i>Bidens bipinnata</i>		*	*					*	*					*	*	*		*		*
<i>Boerhavia coccinea</i>	*	*	*		*			*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Boerhavia gardneri</i>		*	*					*	*	*	*							*		
<i>Boerhavia repleta</i>													*							
<i>Boerhavia</i> sp.														*						*
<i>Bonamia media</i> var. <i>villosa</i>									*		*						*	*	*	
<i>Brachyachne prostrata</i>										*	*									
<i>Bulbostylis barbata</i>	*		*	*	*		*	*	*	*	*	*	*	*		*				
<i>Calandrinia schistorhiza</i>											*									
<i>Calandrinia</i> sp.																				*
<i>Capparis spinosa</i> var. <i>nummularia</i>		*						*												
<i>Cenchrus ciliaris</i>	*		*	*				*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Cenchrus setiger</i>									*	*	*	*	*	*		*	*	*	*	*
<i>Centipeda minima</i> subsp. <i>macrocephala</i>													*							
<i>Cheilanthes brownii</i>	*																			
<i>Cheilanthes lasiophylla</i>	*	*						*												
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>								*												
<i>Chrysopogon fallax</i>																				*
<i>Citrullus colocynthis</i>										*	*		*	*	*	*	*	*	*	*
<i>Cleome viscosa</i>	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Clerodendrum floribundum</i> var. <i>angustifolium</i>		*				*		*								*				
<i>Clerodendrum tomentosum</i> var. <i>lanceolatum</i>		*	*		*		*							*	*	*				
<i>Codonocarpus cotinifolius</i>						*	*													
<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>													*				*			
<i>Convolvulus clementii</i>			*											*	*	*				
<i>Corchorus crozophorifolius</i>		*	*		*	*		*	*	*	*			*	*	*	*	*	*	*
<i>Corchorus laniflorus</i>	*		*					*		*	*			*						

Name	Hills and Breakaways									Plains			Major Drainage			Minor Drainage				
	Hi03	Hi04	Hi08	Hi09	Hi14	Hi16	Hi19	Hi22	HBr4	PI08	PI10	PI11	Ma01	Ma03	Ma04	Mi02	Mi06	Mi08	Mi15	mDr32
<i>Corchorus lasiocarpus</i> ?subsp.				*					*					*						
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>		*			*	*			*							*		*		
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>								*												
<i>Corchorus</i> sp.										*						*				
<i>Corchorus tridens</i>									*	*	*		*	*		*	*	*	*	*
<i>Corymbia ferritcola</i>					*				*					*		*				
<i>Corymbia flavescens</i>					*															
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>		*							*	*	*			*		*	*			
<i>Cucumis maderaspatanus</i>	*	*	*	*	*	*	*	*	*	*	*		*	*		*	*	*	*	*
<i>Cucumis melo</i> subsp. <i>agrestis</i>													*							
<i>Cymbopogon ambiguus</i>	*	*	*	*	*	*	*	*	*	*				*		*		*		
<i>Cymbopogon obtectus</i>	*	*	*		*				*							*				
<i>Cymbopogon</i> sp.									*											
<i>Cynanchum floribundum</i>								*												
<i>Cyperus cunninghamii</i> subsp. <i>cunninghamii</i>			*	*	*			*												
<i>Cyperus vaginatus</i>													*	*	*	*				
<i>Dactyloctenium radulans</i>									*	*	*								*	*
<i>Datura leichhardtii</i>														*		*				
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>			*																	
<i>Dicladantha forrestii</i>																		*		
<i>Digitaria ctenantha</i>			*																	
<i>Dodonaea pachyneura</i>			*	*				*						*		*				
<i>Dodonaea petiolaris</i>			*	*	*			*												
<i>Duperreya commixta</i>			*	*		*	*	*	*	*	*		*	*		*	*	*	*	*
<i>Dysphania rhadinostachya</i> ?subsp.									*											
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	*	*	*	*	*	*	*	*	*	*	*			*	*	*	*	*	*	*
<i>Dysphania</i> sp.		*												*		*				*
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	*	*	*	*	*	*		*	*	*	*	*	*	*		*	*	*	*	*
<i>Enneapogon caeruleus</i>	*	*	*	*	*	*		*	*	*	*	*								
<i>Enneapogon lindleyanus</i>	*	*	*	*	*	*		*	*	*	*	*		*		*		*		
<i>Enneapogon polyphyllus</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*		*	*	*
<i>Enneapogon robustissimus</i>									*											
<i>Eragrostis cumingii</i>			*																	
<i>Eragrostis eriopoda</i>																				*
<i>Eragrostis pergracilis</i>												*								
<i>Eragrostis</i> sp.																	*			*
<i>Eragrostis tenellula</i>													*		*	*				
<i>Eragrostis xerophila</i>																				*
<i>Eremophila cryptothrix</i>	*		*	*	*			*						*		*				
<i>Eremophila cuneifolia</i>	*	*	*	*	*			*	*	*	*	*		*		*		*	*	*
<i>Eremophila exilifolia</i>				*																
<i>Eremophila forrestii</i> ?subsp.										*						*	*	*	*	*
<i>Eremophila fraseri</i> ?subsp.									*											*
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>					*															
<i>Eremophila latrobei</i> ?subsp.	*					*										*				
<i>Eremophila latrobei</i> subsp. <i>filiformis</i>																			*	
<i>Eremophila latrobei</i> subsp. <i>glabra</i>							*													
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	*		*	*	*		*	*												
<i>Eremophila longifolia</i>	*	*	*	*	*			*	*					*	*	*		*		
<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>		*	*						*		*									
<i>Eremophila</i> sp.			*																	
<i>Eremophila tietkensis</i>						*														
<i>Eriachne aristidea</i>				*																
<i>Eriachne mucronata</i>	*		*	*	*	*	*	*	*	*	*	*								*
<i>Eriachne mucronata</i> (arid form) (MET 12 736)	*		*	*	*	*	*	*	*	*	*	*				*				*
<i>Eriachne mucronata</i> (typical form)			*	*	*	*	*	*	*	*	*	*	*	*		*		*		*
<i>Eriachne pulchella</i> ?subsp.						*			*	*	*	*	*	*						*
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	*		*	*	*	*	*	*	*	*	*	*	*	*						
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>			*	*	*	*	*	*	*	*	*	*	*	*				*		
<i>Eriachne</i> sp.											*						*			
<i>Eriachne tenuiculmis</i>														*		*				
<i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i>													*			*				
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	*					*	*	*	*	*	*	*	*	*	*	*				
<i>Eucalyptus victrix</i>													*	*						
<i>Eucalyptus xerothematica</i>								*												
<i>Euphorbia alsiniflora</i>																*				

Name	Hills and Breakaways									Plains			Major Drainage			Minor Drainage				
	Hi03	Hi04	Hi08	Hi09	Hi14	Hi16	Hi19	Hi22	HBr4	PI08	PI10	PI11	Ma01	Ma03	Ma04	Mi02	Mi06	Mi08	Mi15	mDr32
<i>Euphorbia australis</i>	*								*		*	*		*	*	*	*			*
<i>Euphorbia biconvexa</i>											*		*	*		*	*			
<i>Euphorbia boophthona</i>		*							*											
<i>Euphorbia boophthona/tannensis</i>	*																			
<i>Euphorbia hirta</i>													*	*						
<i>Euphorbia schultzi</i>			*	*					*							*		*		
<i>Euphorbia sp.</i>			*																	
<i>Euphorbia sp. (PAN5-15)</i>									*											
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	*	*				*			*					*		*			*	*
<i>Euphorbia wheeleri</i>									*											
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>		*	*	*		*			*	*				*		*		*	*	*
<i>Ficus brachypoda</i>									*											
<i>Flaveria trinervia</i>			*						*					*		*		*		
<i>Glycine canescens</i>															*	*				
<i>Gomphrena canescens</i> subsp. <i>canescens</i>									*										*	
<i>Gomphrena cunninghamii</i>	*	*	*	*	*	*	*	*	*	*	*			*		*	*	*		
<i>Gomphrena kanisii</i>		*	*	*	*				*											
<i>Gomphrena sp.</i>												*								
<i>Goodenia forrestii</i>														*			*			*
<i>Goodenia microptera</i>	*			*					*									*		
<i>Goodenia muelleriana</i>		*	*	*					*									*		
<i>Goodenia sp.</i>									*											
<i>Goodenia stobbsiana</i>					*															
<i>Goodenia tenuiloba</i>			*															*	*	
<i>Gossypium australe</i>		*								*										*
<i>Gossypium australe</i> (Burrup Peninsula form)			*													*				
<i>Gossypium australe</i> (Whim Creek form)	*								*							*		*		
<i>Gossypium robinsonii</i>														*	*	*				
<i>Grevillea berryana</i>	*		*	*	*	*	*	*		*	*	*		*		*	*	*	*	*
<i>Hakea chordophylla</i>		*																		
<i>Hakea lorea</i> subsp. <i>lorea</i>																				*
<i>Helichrysum luteoalbum</i>															*	*				
<i>Heliotropium heteranthum</i>									*											
<i>Heliotropium inexplicitum</i>		*							*											
<i>Hibiscus</i> aff. <i>coatesii</i>		*	*	*	*				*	*				*						
<i>Hibiscus burtonii</i>									*											
<i>Hibiscus coatesii</i>			*		*				*											
<i>Hibiscus gardneri</i>									*			*								
<i>Hibiscus haynaldii</i>		*							*											
<i>Hibiscus sturtii</i> var. <i>platychlamys</i>														*				*		
<i>Hybanthus aurantiacus</i>				*					*		*			*		*	*	*	*	*
<i>Indigofera colutea</i>																		*		
<i>Indigofera monophylla</i>						*	*		*					*		*		*		
<i>Ipomoea muelleri</i>													*							
<i>Iseilema dolichotrichum</i>									*											
<i>Iseilema eremaum</i>									*	*	*									
<i>Iseilema membranaceum</i>	*		*						*	*	*									
<i>Jasminum didymum</i> subsp. <i>lineare</i>	*	*	*	*		*	*	*	*	*	*		*	*	*	*				
<i>Keraudrenia nephrosperma</i>				*					*											
<i>Lepidium oxytrichum</i>		*																		
<i>Lepidium pedicellosum</i>	*		*											*		*				
<i>Lepidium platypetalum</i>												*								
<i>Lobelia heterophylla</i> subsp. <i>pilbarensis</i> N.G. Walsh	*	*	*						*						*	*				
<i>Maireana ? georgei</i>	*		*		*															
<i>Maireana ? triptera</i>			*																	
<i>Maireana georgei</i>	*		*	*												*				
<i>Maireana melanocoma</i>	*		*				*			*	*			*						
<i>Maireana planifolia</i>			*				*			*									*	
<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>												*								
<i>Maireana villosa</i>			*	*					*			*							*	
<i>Malvastrum americanum</i>													*		*	*				
<i>Marsdenia australis</i>						*								*	*	*	*			
<i>Melaleuca glomerata</i>													*	*	*	*				
<i>Melaleuca lasiandra</i>																		*		
<i>Melhania oblongifolia</i>														*	*	*	*			
<i>Mollugo molluginea</i>	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Name	Hills and Breakaways									Plains			Major Drainage			Minor Drainage				
	Hi03	Hi04	Hi08	Hi09	Hi14	Hi16	Hi19	Hi22	HBr4	PI08	PI10	PI11	Ma01	Ma03	Ma04	Mi02	Mi06	Mi08	Mi15	mDr32
<i>Nicotiana ?umbratica</i>			*																	
<i>Nicotiana benthamiana</i>	*	*	*					*												
<i>Nicotiana occidentalis</i> ?subsp.	*		*			*		*						*	*					
<i>Nicotiana occidentalis</i> subsp. <i>obliqua</i>		*																		
<i>Nicotiana occidentalis</i> subsp. <i>occidentalis</i>														*						
<i>Nicotiana</i> sp.								*								*				
<i>Nicotiana umbratica</i> (P3)		*																		
<i>Notoleptopus decaisnei</i> var. <i>orbicularis</i>	*	*	*	*	*			*	*	*	*		*	*	*	*	*	*	*	*
<i>Oldenlandia crouchiana</i>	*	*	*	*	*	*	*	*	*		*			*	*	*	*	*		
<i>Operculina aequisejala</i>														*						
<i>Paraneurachne muelleri</i>							*		*											
<i>Paspalidium clementii</i>	*	*	*	*	*	*	*	*	*					*	*	*		*		
<i>Peripleura arida</i>		*	*			*								*		*				
<i>Perotis rara</i>			*																	
<i>Petalostylis labicheoides</i>													*	*		*				*
<i>Phyllanthus erwinii</i>									*					*			*			
<i>Phyllanthus maderaspatensis</i>								*						*	*	*		*		
<i>Phyllanthus</i> sp.														*						
<i>Pluchea dentex</i>														*						
<i>Pluchea rubelliflora</i>	*												*		*	*				
<i>Pluchea</i> sp.													*			*				
<i>Plumbago zeylanica</i>													*	*						
<i>Polycarpaea corymbosa</i>			*	*				*	*	*	*			*				*	*	*
<i>Polycarpaea holtzei</i>	*		*					*	*											
<i>Polycarpaea longiflora</i>	*	*	*	*	*	*	*	*	*	*	*			*	*	*	*	*	*	*
<i>Polygala isingii</i>							*		*											
<i>Polymeria longifolia</i>			*																	
<i>Portulaca oleracea</i>	*		*	*		*		*	*	*	*	*						*	*	*
<i>Portulaca pilosa</i>					*				*											
<i>Portulaca</i> sp.									*											
<i>Pterocaulon sphacelatum</i>		*																		
<i>Pterocaulon sphaeranthoides</i>	*	*	*	*	*	*		*	*	*			*	*	*	*		*	*	
<i>Ptilotus aevoides</i>									*	*	*	*								*
<i>Ptilotus astrolasius</i>					*															
<i>Ptilotus auriculifolius</i>	*	*	*	*	*	*	*	*	*	*	*			*		*	*	*	*	*
<i>Ptilotus axillaris</i>		*				*														
<i>Ptilotus calostachyus</i>	*	*	*	*	*	*	*	*	*									*		
<i>Ptilotus clementii</i>	*		*	*	*	*	*	*	*											
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	*		*	*	*	*	*	*	*	*	*	*		*		*		*		
<i>Ptilotus fusiformis</i>	*	*	*	*	*	*	*	*	*											
<i>Ptilotus gaudichaudii</i> var. <i>gaudichaudii</i>	*		*	*	*	*	*	*	*											
<i>Ptilotus obovatus</i>	*	*	*	*	*	*	*	*	*	*	*	*		*		*	*	*	*	*
<i>Ptilotus schwartzii</i> var. <i>schwartzii</i>			*	*	*	*		*	*	*	*		*			*		*		
<i>Ptilotus villosiflorus</i>									*											
<i>Rhagodia eremaea</i>		*	*					*		*	*	*		*			*	*		*
<i>Rhodanthe margarethae</i>		*						*												
<i>Rhynchosia minima</i>		*						*		*	*			*	*	*	*	*		
<i>Salsola tragus</i> subsp. <i>tragus</i>	*							*	*	*	*	*		*		*	*	*	*	*
<i>Santalum lanceolatum</i>		*													*	*	*			
<i>Sauropus crassifolius</i>								*												
<i>Scaevola acacioides</i>	*		*	*	*	*	*	*	*					*		*				
<i>Scaevola spinescens</i>									*					*		*				*
<i>Schizachyrium fragile</i>			*						*											
<i>Sclerolaena costata</i>			*							*	*	*							*	*
<i>Sclerolaena densiflora</i>										*	*							*		
<i>Sclerolaena ericantha</i>										*	*									
<i>Senna artemisioides</i> subsp. <i>helmsii</i>			*	*		*	*	*	*		*	*		*	*	*		*	*	*
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	*	*	*		*	*	*	*	*	*	*	*		*	*	*	*	*	*	*
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> (thinly sericeous)											*	*		*		*	*	*	*	*
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>	*	*			*	*	*	*	*	*	*	*		*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> x <i>stricta</i>			*						*	*	*	*		*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	*	*			*	*	*	*	*	*	*	*		*	*	*	*	*	*	*
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*
<i>Senna notabilis</i>	*		*	*	*	*		*	*					*						*
<i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26)												*								

Name	Hills and Breakaways									Plains			Major Drainage			Minor Drainage				
	Hi03	Hi04	Hi08	Hi09	Hi14	Hi16	Hi19	Hi22	HBr4	PI08	PI10	PI11	Ma01	Ma03	Ma04	Mi02	Mi06	Mi08	Mi15	mDr32
<i>Senna stricta</i>		*	*			*			*		*				*	*				
<i>Setaria verticillata</i>															*	*				
<i>Sida aff. clementii</i>			*																	
<i>Sida aff. echinocarpa</i>	*		*	*	*			*	*	*								*		
<i>Sida aff. echinocarpa</i> (MET 15,350)			*		*				*									*		
<i>Sida aff. echinocarpa</i> (WW 15-8)									*									*		
<i>Sida aff. fibulifera</i>																				*
<i>Sida sp.</i>									*											
<i>Sida sp. Pilbara</i> (A.A Mitchell PRP 1543)						*														
<i>Sida sp. spiciform panicles</i> (E. Leyland s.n. 14/8/90)		*		*					*			*								
<i>Sida sp. verrucose glands</i> (F.H. Mollemans 2423)									*				*							
<i>Sisymbrium orientale</i>													*							
<i>Solanum ashbyae</i>	*			*			*											*		
<i>Solanum ellipticum</i>								*	*											
<i>Solanum ferocissimum</i>	*																			
<i>Solanum gabrielae</i>	*		*	*	*	*	*	*	*											
<i>Solanum horridum</i>	*	*	*	*	*	*	*	*	*											
<i>Solanum lasiophyllum</i>	*		*	*	*	*	*	*	*			*		*						
<i>Solanum sp.</i>	*							*				*								
<i>Solanum sturtianum</i>										*	*			*			*	*		
<i>Sonchus oleraceus</i>													*		*	*				
<i>Sporobolus australasicus</i>	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Stemodia grossa</i>	*	*	*					*	*	*			*	*		*		*		
<i>Streptoglossa decurrens</i>		*			*	*									*	*				
<i>Stylobasium spathulatum</i>	*					*	*	*						*	*	*				
<i>Swainsona complanata</i>				*																
<i>Swainsona decurrens</i>									*											
<i>Swainsona maccullochiana</i>		*							*				*	*	*					
<i>Tephrosia aff. clementii</i>																				*
<i>Tephrosia aff. supina</i>		*							*											
<i>Tephrosia densa</i>		*							*							*		*		
<i>Tephrosia rosea</i> var. <i>glabrior</i>													*	*	*					
<i>Tephrosia rosea</i> var. <i>rosea</i>		*							*											
<i>Themeda triandra</i>		*							*					*		*		*		
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>		*	*	*	*	*	*	*	*					*		*		*		
<i>Trachymene pilbarensis</i>	*	*	*	*	*	*	*	*	*					*	*	*		*		
<i>Trachymene sp.</i>	*								*								*	*		
<i>Tragus australianus</i>										*	*									
<i>Trianthema glossostigma</i>											*									
<i>Trianthema oxycalyptra</i> var. <i>oxycalyptra</i>												*								
<i>Trianthema triquetra</i>									*		*	*							*	
<i>Tribulus hirsutus</i>		*							*											
<i>Tribulus suberosus</i>	*	*	*	*	*	*	*	*	*	*	*	*		*		*		*	*	
<i>Trichodesma zeylanicum</i> ?var.		*	*	*	*	*	*	*	*		*			*	*	*	*	*	*	*
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	*			*		*				*										
<i>Triodia ? wiseana</i>											*									
<i>Triodia angusta</i>	*		*		*					*				*		*				
<i>Triodia epactia</i>													*		*				*	
<i>Triodia wiseana</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Tripogon loliiformis</i>					*	*			*	*	*									
<i>Triumfetta clementii</i>		*	*	*	*		*	*	*	*	*			*		*	*	*	*	*
<i>Triumfetta maconochieana</i>				*				*												
<i>Vachellia farnesiana</i>													*							*
<i>Zaleya galericulata</i> subsp. <i>galericulata</i>	*		*				*		*					*		*				

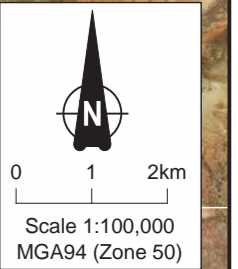
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## **Appendix Q: Map of Priority Flora Locations**

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Author: J. Atkinson ~ Drawn: CAD Resources ~ Tel 9246 3242 ~ URL www.cadresources.com.au ~ Date Nov 2011 ~ A3 ~ CAD Ref g1505\_Ast\_V\_HRs2\_Loc\_03.dgn



- Priority Species**
- ▼ *Nicotiana ?umbratica* (P3)
  - ▼ *Nicotiana umbratica* (P3)



- LEGEND**
- Survey Area
  - Other Completed Vegetation and Flora Mapping

**HARDEY GAS PIPELINE  
AND RESOURCE AREA  
(PHASE 2)**

**PRIORITY SPECIES**

Author: J. Atkinson      Date: November 2011

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## **Appendix R: Priority Flora Locations and Descriptions**

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Table R.1: Locations of Priority Flora recorded in the Survey Area.

Species	Site	Habitat	Vegetation Association	Cover (%)	GPS coordinate (GDA 94)	Associated species
<i>Nicotiana umbratica</i>	2RA19	Rocky outcrop on high hill.	Hi04	<2	532461 E, 7463144 N	<i>Acacia arida</i> , <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Triodia wiseana</i> .
<i>Nicotiana ?umbratica</i>	2RAR16	Rocky breakaway (hill).	Hi04	<2	531193 E, 7462655 N	
	1RA25	Southeast facing slope into narrow valley.	Hi08	<2	530845 E, 7461578 N	<i>Acacia aptaneura</i> , <i>A. synchronicia</i> , <i>Dodonaea petiolaris</i> , <i>Ptilotus obovatus</i> , <i>Triodia angusta</i> , <i>T. wiseana</i> .

Table R.2: Descriptions of Priority Flora recorded in the Survey Area.

Species	Previously recorded locations (Florabase 2011)	Description	Habitat
<i>Nicotiana umbratica</i> (P3)	<p><i>Nicotiana umbratica</i></p>	An erect, short-lived annual to perennial, herb, between 0.3 and 0.7 m high. It has white flowers between April and June.	<i>Nicotiana umbratica</i> has previously been recorded on shallow soils, in association with rocky outcrops.

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## **Appendix S: Introduced Flora Locations and Descriptions**

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Table S.1: Locations of Introduced Flora recorded in the Survey Area.

Species	Cover (%)	Site Number	Habitat	Easting	Northing
* <i>Acetosa vesicaria</i> (L.) A.Love	<2	1GP03	Flat plain.	510988	7457061
	<2	1RA04	Floodplain on west side of creek.	532169	7461160
	<2	1RA46	Drainage channel running north-south and flood banks.	529859	7460181
	<2	2RA05	Major creek bed and bank.	534204	7460832
	<2	2RA07	Southerly sloping hill.	533585	7460742
	<2	2RAr03	Minor incised drainage channel draining low hill range.	534651	7461372
	<2	2RAr09	Flood plain with incised channels.	533020	7460490
	<2	Opportunistic	Floodplain.	532185	7461118
	<2	Opportunistic	Minor creek.	531443	7462319
	2-10	Opportunistic	Minor creek.	531750	7462967
	>70	Opportunistic	Not Recorded.	531788	7463004
	2-10	Opportunistic	Hill.	531758	7462995
	<2	Opportunistic	Floodplain.	531586	7462826
	<2	Opportunistic	Minor creek.	531559	7462746
	<2	Opportunistic	Minor creek.	529854	7460288
<2	Opportunistic	Minor creek.	529817	7460389	
* <i>Aerva javanica</i> (Burm.f.) Schult.	<2	1GP02	Floodplain.	514433	7456995
	<2	1RA02	Southwest side of low rocky rise.	531872	7460592
	1	1RA04	Floodplain on west side of creek.	532169	7461160
	<2	1RA05	Drainage channel bank and tributary channel draining small range of rocky crops.	531966	7461487
	<2	1RA06	Hill crest with exposed rocks.	531563	7461993
	<2	1RA08	Moderately steep east facing slope, near the crest of a hill.	530244	7462711
	<2	1RA09	Narrow creek.	530435	7461567
	<2	1RA14b	Banks and flow line of creek.	530789	7461867
	<2	1RA17	Southeast facing rocky slope with outcrops.	531177	7462228
	<2	1RA23	Southeast edge on top of high rocky hill.	531629	7461343
	<2	1RA46	Drainage channel running north-south and flood banks.	529859	7460181
	<2	2RA05	Major creek bed and bank.	534204	7460832
	<2	2RA07	Southerly sloping hill.	533585	7460742

Species	Cover (%)	Site Number	Habitat	Easting	Northing
	<2	2RA08	Northeast facing slope of hill.	535634	7462730
	<2	2RA11	Minor creekline.	532872	7461087
	<2	2RA13	Stony top of low rise.	532137	7462132
	<2	2RA18	Major creekline between hills.	531660	7462881
	1	2RAr09	Flood plain with incised channels.	533020	7460490
	<2	2RAr20	Convergence of three minor drainage lines.	532987	7461885
	30-70	Opportunistic	miC	530884	7462554
	10-30	Opportunistic	Hill.	531573	7460655
	10-30	Opportunistic	Minor creek.	531780	7460731
	30-70	Opportunistic	Floodplain.	531823	7460685
	<2	Opportunistic	Minor creek.	530228	7461789
	<2	Opportunistic	Minor creek.	530290	7461418
	<2	Opportunistic	Floodplain.	532196	7461243
	<2	Opportunistic	Floodplain.	532185	7461118
	<2	Opportunistic	Plain.	532042	7461426
	<2	Opportunistic	Hill.	531475	7461648
	<2	Opportunistic	Minor creek.	532830	7461299
	10-30	Opportunistic	Plain.	530822	7461884
	40	Opportunistic	Plain.	531085	7462501
	30-70	Opportunistic	Minor creek.	532081	7462152
	<2	Opportunistic	Hill.	531785	7463019
	2-10	Opportunistic	Hill.	529983	7463150
	<2	Opportunistic	Hill.	530106	7463123
	30-70	Opportunistic	Minor creek.	530197	7462996
	30	Opportunistic	Hill.	530591	7462792
	50	Opportunistic	Hill.	530730	7462715
	25	Opportunistic	Hill.	530808	7462650
* <i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	<2	2RA05	Major creek bed and bank.	534204	7460832
* <i>Bidens bipinnata</i> L.	<2	1RA06	Hill crest with exposed rocks.	531563	7461993
	<2	1RA09	Narrow creek.	530435	7461567
	<2	1RA1	Not Recorded.	530926	7460383
	<2	1RA17	Southeast facing rocky slope with outcrops.	531177	7462228
	<2	1RA19	South facing cliffs and	530395	7461179

Species	Cover (%)	Site Number	Habitat	Easting	Northing
			breakaways.		
	<2	1RA25	Southeast facing slope into narrow valley.	530845	7461578
	<2	1RA46	Drainage channel running north-south and flood banks.	529859	7460181
	<2	2RA08	Northeast facing slope of hill.	535634	7462730
	<2	2RA18	Major creekline between hills.	531660	7462881
	<2	2RA19	Rocky outcrop on high hill.	532461	7463144
	<2	2RAr14	Major creekline and banks between steeply sloping hills. Creek incised on one side.	529824	7463134
	<2	2RAr15	Minor drainage channel between steep sided hills forming shallow gorge.	532494	7462654
	<2	2RAr16	Rocky breakaway (hill).	531193	7462655
	<2	2RAr21	Minor drainage channel through steep sided hills.	531511	7463185
	<2	Opportunistic	Minor creek.	530204	7461420
	<2	Opportunistic	Minor creek.	530175	7461416
	<2	Opportunistic	Minor creek.	530155	7461411
	<2	Opportunistic	Minor creek.	530226	7461418
	2-10	Opportunistic	Minor creek.	530346	7461472
		Opportunistic	Minor creek.	530290	7461418
	10-30	Opportunistic	Plain.	531429	7461668
	<2	Opportunistic	Minor creek.	531750	7462967
	<2	Opportunistic	Not Recorded.	531788	7463004
	<2	Opportunistic	Hill.	531741	7462981
	<2	Opportunistic	Floodplain.	531608	7462861
	<2	Opportunistic	Minor creek.	531526	7461845
	<2	Opportunistic	Hill.	530699	7462224
	<2	Opportunistic	Minor creek.	530494	7460566
	<2	Opportunistic	Minor creek.	529829	7460325
* <i>Cenchrus ciliaris</i> L.	65	1GP02	Floodplain.	514433	7456995
	60	1GP03	Flat plain.	510988	7457061
	<2	1GP06	Low hillslope, hilltop.	512867	7457223
	65	1GP10	Plain.	515170	7457902
	7	1GPr01	Minor drainage line and outwash flow plains.	516252	7458997
	8	1GPr08	Stony plain.	506360	7456226
	1	1GPr08	Stony plain.	506360	7456226

Species	Cover (%)	Site Number	Habitat	Easting	Northing
	<2	1GPr12	Flat plain.	515608	7458386
	1	1RA03	South west sloping plain with cobble-sized rocky mantle.	531958	7460819
	60	1RA04	Floodplain on west side of creek.	532169	7461160
	30	1RA05	Drainage channel bank and tributary channel draining small range of rocky crops.	531966	7461487
	<2	1RA06	Hill crest with exposed rocks.	531563	7461993
	<2	1RA08	Moderately steep east facing slope, near the crest of a hill.	530244	7462711
	1	1RA09	Narrow creek.	530435	7461567
	<2	1RA10	Not Recorded.	530163	7461754
	<2	1RA11	South face of rocky hill.	529837	7461568
	2	1RA14b	Banks and flow line of creek.	530789	7461867
	<2	1RA17	Southeast facing rocky slope with outcrops.	531177	7462228
	<2	1RA19	South facing cliffs and breakaways.	530395	7461179
	<2	1RA23	Southeast edge on top of high rocky hill.	531629	7461343
	<2	1RA25	Southeast facing slope into narrow valley.	530845	7461578
	<2	1RA27	North facing rocky slope with small crags.	531503	7461624
	<2	1RA28	North facing slope with outcrop at crest of hill at south end. Scattered small rock pavements throughout slope.	532209	7461409
	<2	1RA29	Hill crest and south facing slope.	532586	7461028
	<2	1RA34	Outcropping angular ironstone ridge of low rocky hill.	530660	7462218
	<2	1RA38	Southern slope of low rocky hill.	530457	7460678
	8	1RA46	Drainage channel running north-south and flood banks.	529859	7460181
	6	2GPr01	Summit and eastern slopes of very low rocky hill	511762	7457123
	40	2GPr02	Floodplain.	502981	7453836
	<2	2RA01	Flat plain in between minor and major drainage lines surrounded by low hills.	534715	7461539
	40	2RA02	Broad drainage line and floodplain.	535321	7463605
	10	2RA05	Major creek bed and bank.	534204	7460832
	<2	2RA07	Southerly sloping hill.	533585	7460742

Species	Cover (%)	Site Number	Habitat	Easting	Northing
	<2	2RA08	Northeast facing slope of hill.	535634	7462730
	35	2RA11	Minor creekline.	532872	7461087
	<2	2RA17	Hilltop.	531759	7462673
	<2	2RA18	Major creekline between hills.	531660	7462881
	10	2RAr03	Minor incised drainage channel draining low hill range.	534651	7461372
	25	2RAr04	Broad floodplain.	535712	7463659
	<2	2RAr06	Hilltops and upper slopes.	534893	7463310
	20	2RAr09	Flood plain with incised channels.	533020	7460490
	10	2RAr14	Major creekline and banks between steeply sloping hills. Creek incised on one side.	529824	7463134
	<2	2RAr15	Minor drainage channel between steep sided hills forming shallow gorge.	532494	7462654
	<2	6RAr01	Gently undulating stony plain.	531400	7461729
	<2	Opportunistic	Minor creek.	530204	7461420
	<2	Opportunistic	Minor creek.	530155	7461411
	<2	Opportunistic	Minor creek.	530226	7461418
	2-10	Opportunistic	Minor creek.	530346	7461472
	2-10	Opportunistic	Minor creek.	532858	7461360
	<2	Opportunistic	Floodplain.	532196	7461243
	30-70	Opportunistic	Floodplain.	532160	7461249
	10-30	Opportunistic	Floodplain.	532185	7461118
	30-70	Opportunistic	Floodplain.	532169	7461420
	30-70	Opportunistic	Floodplain.	532152	7461424
	30-70	Opportunistic	Floodplain.	532100	7461473
	40	Opportunistic	Plain.	532042	7461426
	30	Opportunistic	Floodplain.	531923	7461447
	10-30	Opportunistic	Floodplain.	532038	7461440
	2-10	Opportunistic	Minor creek.	532830	7461299
	10-30	Opportunistic	Plain.	532048	7461456
	2-10	Opportunistic	Minor creek.	531865	7461694
	10-30	Opportunistic	Minor creek.	530736	7461862
	30-70	Opportunistic	Plain.	530899	7461902
	<2	Opportunistic	Minor creek.	532090	7462198
	2-10	Opportunistic	Minor creek.	532119	7462179
	10-30	Opportunistic	Minor creek.	531527	7461844
	10-30	Opportunistic	Minor creek.	530649	7462180

Species	Cover (%)	Site Number	Habitat	Easting	Northing
	2-10	Opportunistic	Minor creek.	529854	7460288
	2-10	Opportunistic	Minor creek.	529817	7460389
	10-30	Opportunistic	MaC	530171	7462632
	30-70	Opportunistic	MaC	529902	7462796
	<2	Opportunistic	Minor creek.	531354	7461792
	10-30	Opportunistic	Plain.	516115	7459145
	2-10	Opportunistic	Plain.	516031	7459199
	<2	Opportunistic	Plain.	515992	7459115
	30-70	Opportunistic	Floodplain.	516376	7459161
	30-70	Opportunistic	Minor creek.	516364	7459218
	30-70	Opportunistic	Plain.	516325	7459100
	2-10	Opportunistic	Minor creek.	531780	7460731
	10-30	Opportunistic	Hill.	531784	7460674
* <i>Cenchrus setiger</i> Vahl	2	1GP02	Floodplain.	514433	7456995
	<2	1RA03	South west sloping plain with cobble-sized rocky mantle.	531958	7460819
	2	1RA04	Floodplain on west side of creek.	532169	7461160
	1	1RA05	Drainage channel bank and tributary channel draining small range of rocky crops.	531966	7461487
	1	1RA46	Drainage channel running north-south and flood banks.	529859	7460181
	5	2GPr02	Floodplain.	502981	7453836
	1.5	2RA02	Broad drainage line and floodplain.	535321	7463605
	30	2RA05	Major creek bed and bank.	534204	7460832
	2	2RA11	Minor creekline.	532872	7461087
	<2	2RAr03	Minor incised drainage channel draining low hill range.	534651	7461372
	<2	2RAr04	Broad floodplain.	535712	7463659
	10	2RAr09	Flood plain with incised channels.	533020	7460490
	<2	2RAr14	Major creekline and banks between steeply sloping hills. Creek incised on one side.	529824	7463134
	40	Opportunistic	Floodplain.	531923	7461447
	30-70	Opportunistic	Floodplain.	532038	7461440
	30-70	Opportunistic	Plain.	532048	7461456
	30-70	Opportunistic	Plain.	530899	7461902
* <i>Citrullus colocynthis</i>	<2	1GPr01	Minor drainage line and outwash flow plains.	516252	7458997




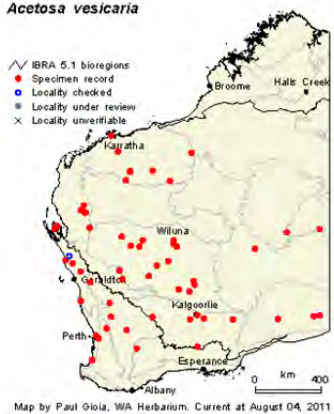

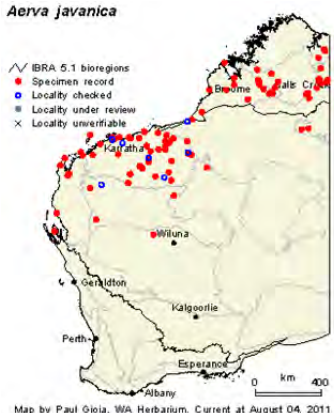
Species	Cover (%)	Site Number	Habitat	Easting	Northing
(L.) Schrad.	<2	1RA03	South west sloping plain with cobble-sized rocky mantle.	531958	7460819
	<2	1RA04	Floodplain on west side of creek.	532169	7461160
	<2	1RA05	Drainage channel bank and tributary channel draining small range of rocky crops.	531966	7461487
	<2	2RA05	Major creek bed and bank.	534204	7460832
	<2	2RA11	Minor creekline.	532872	7461087
	<2	2RAr04	Broad floodplain.	535712	7463659
	<2	2RAr09	Flood plain with incised channels.	533020	7460490
	<2	2RAr15	Minor drainage channel between steep sided hills forming shallow gorge.	532494	7462654
	<2	Opportunistic	Floodplain.	532160	7461249
	10-30	Opportunistic	Floodplain.	531923	7461447
	2-10	Opportunistic	Plain.	532048	7461903
	<2	Opportunistic	Minor creek.	532119	7462179
	<2	Opportunistic	Minor creek.	532126	7462206
	<2	Opportunistic	Minor creek.	532212	7462338
	2-10	Opportunistic	Hill.	530730	7462715
	<2	Opportunistic	Hill.	530943	7462515
	<2	Opportunistic	Road.	531241	7461901
	<2	Opportunistic	Minor creek.	530533	7460248
2-10	Opportunistic	Minor creek.	531354	7461792	
* <i>Cucumis melo</i> subsp. <i>agrestis</i> (Naudin) Pangalo	<2	2RA05	Major creek bed and bank.	534204	7460832
* <i>Datura leichhardtii</i> Benth.	<2	1RA14b	Banks and flow line of creek.	530789	7461867
* <i>Euphorbia hirta</i> L.	<2	2RA05	Flood plain with incised channels.	534204	7460832
* <i>Flaveria trinervia</i> (Spreng.) C.Mohr	<2	2RAr09	Major creek bed and bank.	533020	7460490
	<2	1RA09	Narrow creek.	530435	7461567
	<2	1RA14b	Southeast facing rocky slope with outcrops.	530789	7461867
	<2	1RA17	Southeast facing rocky slope with outcrops.	531177	7462228
	<2	2RA13	Stony top of low rise.	532137	7462132


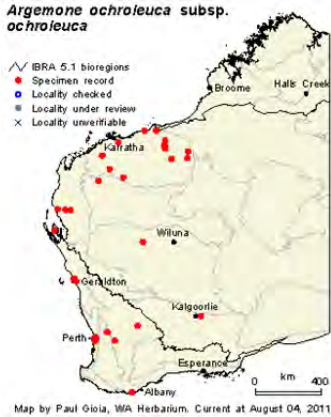

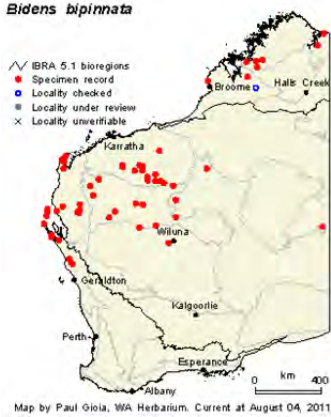
Species	Cover (%)	Site Number	Habitat	Easting	Northing
	<2	2RA18	Major creekline between hills.	531660	7462881
	<2	2RAr03	Minor incised drainage channel draining low hill range.	534651	7461372
	<2	2RAr14	Major creekline and banks between steeply sloping hills. Creek incised on one side.	529824	7463134
	<2	2RAr20	Convergence of three minor drainage lines.	532987	7461885
	<2	Opportunistic	Hill.	530686	7462139
	<2	Opportunistic	Minor creek.	530547	7460493
	<2	Opportunistic	Minor creek.	529854	7460288
	<2	Opportunistic	Minor creek.	529817	7460389
	<2	Opportunistic	Minor creek.	531846	7461625
	<2	Opportunistic	Minor creek.	532090	7462198
	<2	Opportunistic	Minor creek.	532126	7462206
	<2	Opportunistic	Hill.	531775	7463014
	2-10	Opportunistic	Minor creek.	531719	7462902
	<2	Opportunistic	Minor creek.	532212	7462338
<i>*Malvastrum americanum</i> (L.) Torr.	<2	2RA05	Major creek bed and bank.	534204	7460832
	<2	2RAr15	Minor drainage channel between steep sided hills forming shallow gorge.	532494	7462654
	<2	2RAr20	Convergence of three minor drainage lines.	532987	7461885
	<2	Opportunistic	Minor creek.	532119	7462179
	<2	Opportunistic	Minor creek.	532126	7462206
	<2	Opportunistic	Minor creek.	531526	7461844
	<2	Opportunistic	Minor creek.	529743	7460429
<i>*Portulaca oleracea</i> L.	<2	1GP10	Plain.	515170	7457902
	<2	1GPr01	Minor drainage line and outwash flow plains.	516252	7458997
	<2	1GPr04	Low hills facing west.	513963	7457222
	<2	1GPr12	Flat plain.	515608	7458386
	<2	1RA01	Very gently undulating narrow plain at southern base of low rocky hills.	530926	7460383
	<2	1RA02	Southwest side of low rocky rise.	531872	7460592
	<2	1RA03	South west sloping plain with cobble-sized rocky mantle.	531958	7460819
	<2	1RA06	Hill crest with exposed rocks.	531563	7461993
	<2	1RA07	North facing slope with minor drainage depression.	530268	7462865


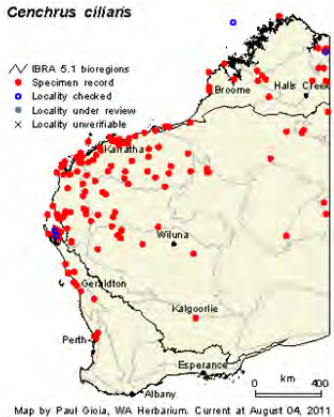
Species	Cover (%)	Site Number	Habitat	Easting	Northing
	<2	1RA08	Moderately steep east facing slope, near the crest of a hill.	530244	7462711
	<2	1RA14	Gentle northeast facing slopes at base of hill with rock crags.	530188	7461388
	<2	1RA17	Southeast facing rocky slope with outcrops.	531177	7462228
	<2	1RA19	South facing cliffs and breakaways.	530395	7461179
	<2	1RA23	Southeast edge on top of high rocky hill.	531629	7461343
	<2	1RA29	Hill crest and south facing slope.	532586	7461028
	<2	1RA32	Top of rocky hill. Gentle incline to north-west.	529487	7462313
	<2	1RA37	Northwest facing slope in narrow valley.	529618	7460644
	<2	1RA38	Southern slope of low rocky hill.	530457	7460678
	<2	1RA45	Southeast facing slope in narrow valley. Slope has scattered small rock piles.	531773	7460770
	<2	1RA46	Drainage channel running north-south and flood banks.	529859	7460181
	<2	2RA02	Broad drainage line and floodplain.	535321	7463605
	<2	2RA07	Southerly sloping hill.	533585	7460742
	<2	2RA08	Northeast facing slope of hill.	535634	7462730
	<2	2RAr03	Minor incised drainage channel draining low hill range.	534651	7461372
	<2	2RAr04	Broad floodplain.	535712	7463659
	<2	6RAr01	Gently undulating stony plain.	531400	7461729
	<2	Opportunistic	Hill.	531156	7462274
	<2	Opportunistic	Hill.	530503	7460618
	<2	Opportunistic	Hill.	530511	7460661
	<2	Opportunistic	Hill.	529616	7460506
<i>*Setaria verticillata</i> (L.) P.Beauv.	<2	2RA18	Major creekline between hills.	531660	7462881
	<2	2RAr15	Minor drainage channel between steep sided hills forming shallow gorge.	532494	7462654
	<2	Opportunistic	Minor creek.	532126	7462206
<i>*Sisymbrium orientale</i> L.	<2	2RA05	Major creek bed and bank.	534204	7460832
<i>*Sonchus oleraceus</i> L.	<2	2RA05	Major creek bed and bank.	534204	7460832
	<2	2RAr15	Minor drainage channel between steep sided hills	532494	7462654


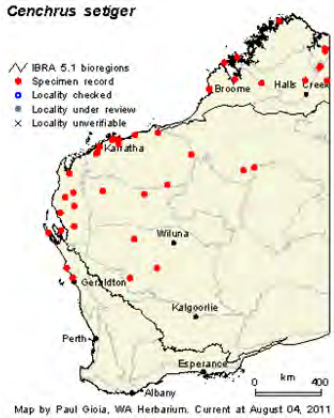

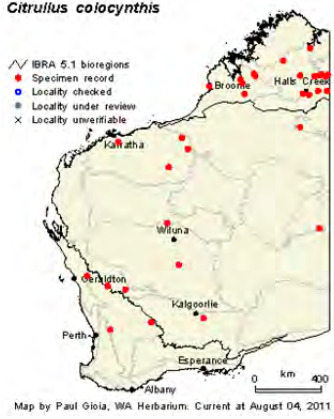
Species	Cover (%)	Site Number	Habitat	Easting	Northing
			forming shallow gorge.		
* <i>Vachellia farnesiana</i> (L.) Wight & Arn.	<2	2RA05	Major creek bed and bank.	534204	7460832
	<2	2RAr04	Broad floodplain.	535712	7463659

Table S.2: Description of Introduced Flora recorded in the Survey Area.


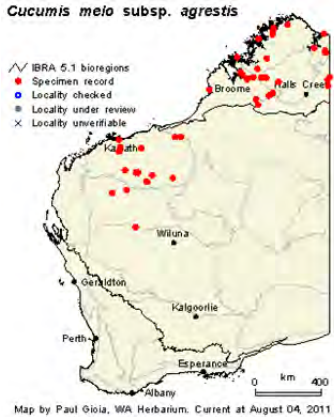

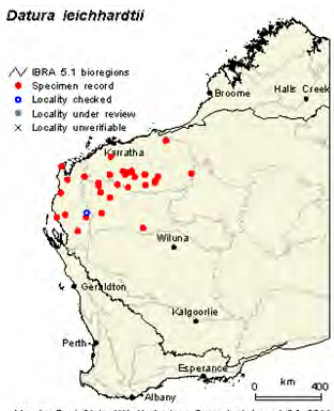
Species	Previously recorded location (Florabase 2011)	Description	Habitat
<p>*<i>Acetosa vesicaria</i> (Ruby Dock)</p> 	<p><i>Acetosa vesicaria</i></p>  <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>An erect, stout, fleshy, hollow-stemmed annual, herb between 0.2 and 1.0 m high with ovate to heart-shaped, thick, fleshy leaves, 5-10 cm long. It has inconspicuous pinkish red flowers arranged in racemes between July and September.</p>	<p>Commonly occurs on sandy alluvial and gravelly ironstone soils; along roadsides and in disturbed areas.</p>
<p>*<i>Aerva javanica</i> (Kapok)</p> 	<p><i>Aerva javanica</i></p>  <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>An erect, much-branched perennial, herb between 0.4 and 1.6 m high with alternate, densely hairy leaves. It has white woolly flowers arranged in spikes between January and October.</p>	<p>Occurs amongst tall trees, medium trees (<i>Eucalyptus</i> woodland), low trees, low (sclerophyll) shrubland, grassland, spinifex grassland; occurring on outcrops, on the coast; in rocky or stony soil, gravelly soil, sand, loam, clay; occupying sand-dunes; floodplains; river-banks; creeklines; drainage-lines; growing in disturbed natural vegetation.</p>


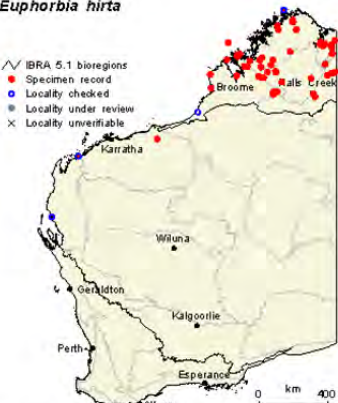

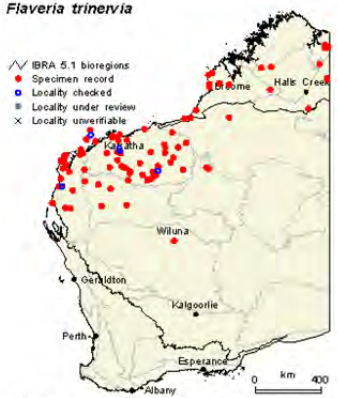
Species	Previously recorded location (Florabase 2011)	Description	Habitat
<p>*<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i> (Mexican Poppy)</p> 	 <p><i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i></p> <p>             ✓ IBRA 5.1 bioregions              ● Specimen record              ◻ Locality checked              ◼ Locality under review              × Locality unverifiable         </p> <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>An erect glaucous annual herb between 0.2 and 1 m in height with white, cream and yellow flowers between February/March and July/November. Highly toxic. <i>Argemone ochroleuca</i> is a Declared Weed in numerous Western Australian municipalities but not a Declared Weed in the Shires of Ashburton or Roebourne. <i>Argemone ochroleuca</i> is a highly toxic species.</p>	<p>Generally prefers sandy and loamy soils along creek edges, riverbanks and roadsides. Establishment of this plant commonly takes place on disturbed sites and bare ground.</p>
<p>*<i>Bidens bipinnata</i> (Bipinnate beggarstick)</p> 	 <p><i>Bidens bipinnata</i></p> <p>             ✓ IBRA 5.1 bioregions              ● Specimen record              ◻ Locality checked              ◼ Locality under review              × Locality unverifiable         </p> <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>An erect annual herb, between 0.1 and 0.9 m (sometimes to 1.5 m) high with yellow flowers that bloom from March to September.</p>	<p>Favours alluvium, clay, loam over sandstone and limestone. It is usually found along rivers &amp; creeks, coastal areas and on rocky hillsides.</p>


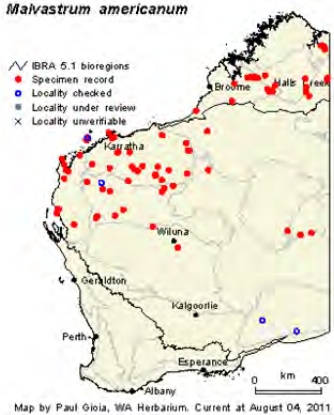

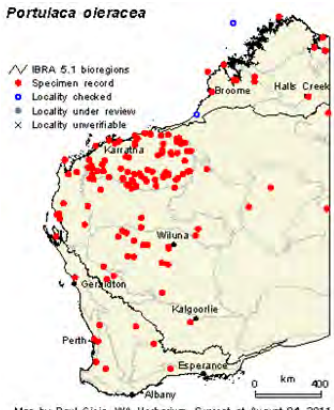
Species	Previously recorded location (Florabase 2011)	Description	Habitat
<p>*<i>Cenchrus ciliaris</i> (Buffel Grass)</p> 		<p>A tufted or sometimes stoloniferous perennial grass between 0.2 and 1.5 m in height with purple, ciliate flowers between February and October.</p> <p><i>Cenchrus ciliaris</i> was originally planted as a pastoral grass in the region, but it has been shown to suppress the growth of surrounding plants due to allelopathic compounds (Halsall et al. 1995) and therefore has the ability to alter the composition of vegetation communities.</p>	<p>Favours sand but may also establish in loamy and clayey soils, particularly disturbed soils in coastal and drainage areas.</p>


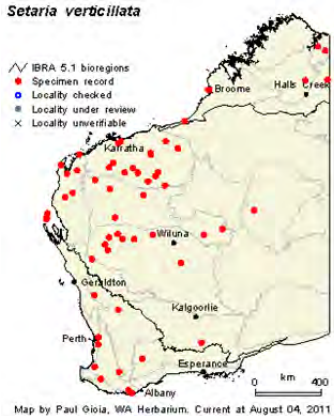

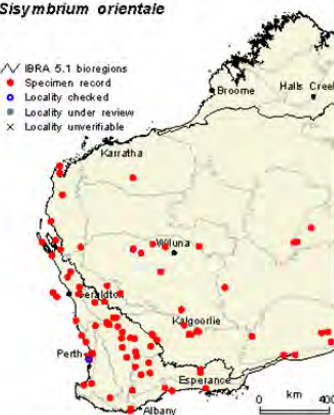
Species	Previously recorded location (Florabase 2011)	Description	Habitat
<p>*<i>Cenchrus setiger</i> (Birdwood Grass)</p> 	<p><i>Cenchrus setiger</i></p> 	<p>An erect, stoloniferous perennial tussock grass, up to 0.8 m high with a compact green, spike-like inflorescence to 20 cm long produced in spring and summer.</p>	<p>Commonly occurs on brown sands, red loam and pindan soils; on sand dunes, plains, rangelands, stony hillsides, floodplains.</p>
<p>*<i>Citrullus colocynthis</i> (Colocynth)</p> 	<p><i>Citrullus colocynthis</i></p> 	<p>A trailing perennial, herb or climber with deeply lobed, 2-10 x 2-7 cm scabrous leaves. It has greenish yellow flowers 6-8 mm long between January and October. Fruits are a spherical melon 5-12 cm diamete, mottled green and yellow or all yellow with dull yellow-brown seeds.</p>	<p>Commonly occurs on sandy, rocky, stony loam, clay and wet soils; often in floodplains and disturbed areas such as graded roadsides.</p>



Species	Previously recorded location (Florabase 2011)	Description	Habitat
<p>*<i>Cucumis melo</i> subsp. <i>agrestis</i> (Ulcardo Melon)</p> 	<p><i>Cucumis melo</i> subsp. <i>agrestis</i></p>  <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>A trailing annual, herb or climber, with ovate lobed leaves. It has yellow flowers, solitary or in clusters of 2-4, between February and June or September and October.</p>	<p>Occurs on a variety of soils, particularly clay in disturbed areas or along drainage lines.</p>
<p>*<i>Datura leichhardtii</i> (Native Thornapple)</p> 	<p><i>Datura leichhardtii</i></p>  <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>A stout annual herb, between 0.2 and 1.0 m high, with ovate, lobed leaves. It has solitary white flowers between June and October. The fruits are spiny and 3 cm wide.</p>	<p>Occurs mostly on alluvial soils, often along watercourses.</p>

Species	Previously recorded location (Florabase 2011)	Description	Habitat
<p>*<i>Euphorbia hirta</i> (Asthma Plant)</p> 	<p><i>Euphorbia hirta</i></p>  <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>An erect or decumbent, much-branched annual, herb, between 0.1 and 0.8 m high, with opposite, narrowly ovate leaves with dark red splotches. It has yellow/green/white flowers arranged in a dense axillary cluster, between January and October.</p>	<p><i>Euphorbia hirta</i> commonly occurs on alluvial soils, often along watercourses.</p>
<p>*<i>Flaveria trinervia</i> (Speedy Weed)</p> 	<p><i>Flaveria trinervia</i></p>  <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>An erect annual herb, with ovate leaves. It has yellow flowers clustered to form a dense inflorescence.</p>	<p>Occurs in a variety of soils, particularly sandy and clayey sites. Typically occurs in drainage lines.</p>

Species	Previously recorded location (Florabase 2011)	Description	Habitat
<p><i>*Malvastrum americanum</i> (Spiked Malvastrum)</p> 	<p><i>Malvastrum americanum</i></p>  <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>An erect, hairy perennial herb or shrub between 0.5 and 1.3 m in height. Flowers are yellow and orange, occurring in a dense terminal spike between April and July.</p>	<p>Occurs in a variety of sandy and clayey soils, areas of limestone along stony ridges and hillsides, floodplains and along drainage lines.</p>
<p><i>*Portulaca oleracea</i> (Purslane)</p> 	<p><i>Portulaca oleracea</i></p>  <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>A succulent, prostrate to decumbent annual, herb, up to 0.2 m high, with shiny, spoon-shaped leaves. It has yellow flowers arranged in the axils of the leaves.</p>	<p>Found on a variety of soils including clay, loam and sand, and is often found in disturbed sites. Often on stony ground.</p>

Species	Previously recorded location (Florabase 2011)	Description	Habitat
<p>*<i>Setaria verticillata</i> (Whorled Pigeon Grass)</p> 	 <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>A loosely tufted annual grass, 0.1 to 1.3 metres high. It flowers from December to June.</p>	<p>Found on a variety of soils including sand, clay and loam.</p>
<p>*<i>Sisymbrium orientale</i> (Indian Hedge Mustard)</p>  <p><i>Sisymbrium orientale</i> Photos: J. Dodd &amp; R. Robson</p>	 <p>Map by Paul Gioia, WA Herbarium. Current at August 04, 2011</p>	<p>An erect annual or biennial, herb, between 0.1 and 1.0 m high. It has yellow flowers between March and November.</p>	<p><i>Sisymbrium orientale</i> is found on a variety of soils, often in disturbed areas.</p>


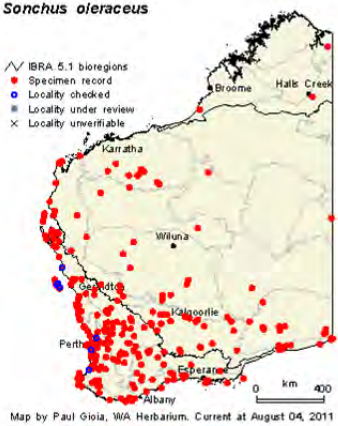

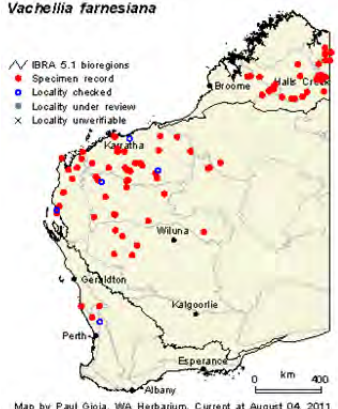
Species	Previously recorded location (Florabase 2011)	Description	Habitat
<p>*<i>Sonchus oleraceus</i> (Common Sowthistle)</p> 	<p><i>Sonchus oleraceus</i></p> 	<p>An erect annual herb, up to 1.5 m high. It has yellow flowers between January and December.</p>	<p><i>Sonchus oleraceus</i> occurs on a variety of soils, and is commonly found in waste places and disturbed ground.</p>
<p>*<i>Vachellia farnesiana</i> (Mimosa Bush)</p> 	<p><i>Vachellia farnesiana</i></p> 	<p>An erect, spreading, thicket-forming thorny tree or shrub, up to 4 m high with dark grey, rough bark and pinnate leaves. It has yellow flowers between June and August.</p>	<p>Found on stony sandy, clay or loam soils and gravel; often in low-lying areas, river and creek banks and disturbed sites.</p>

Table S.3: Summary Assessment of Introduced Flora recorded in the Survey Area (DEC, 2011).

Species	Environmental Weed Strategy Rating (Low, Mild, Moderate, High)	Ecological Impact (Low, Moderate, High, Unknown)	Current Distribution (Low, Moderate, High, Unknown)	Potential Distribution (Low, Moderate, High, Unknown)	Invasiveness (Rapid, Moderate, Slow)	General Trend (Increasing, Stable, Decreasing, Unknown)	Status (Outside, Emerging, Established, Unknown)	Feasibility for Control (Low, Moderate, High, Unknown)
* <i>Acetosa vesicaria</i> (Ruby Dock)	Not Assessed	High	High	High	Rapid	Increasing	Established	High
* <i>Aerva javanica</i> (Kapok)	High	High	Moderate	Low	Rapid	Increasing	Established	High-Moderate
* <i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i> (Mexican Poppy)	Mild	Low	High	Low	Rapid	-	-	Low
* <i>Bidens bipinnata</i> (Bipinnate beggarstick)	Unrated	Unknown	High	High	Rapid	-	-	-
* <i>Cenchrus ciliaris</i> (Buffel Grass)	High	High	High	High	Rapid	Increasing	Established	Low
* <i>Cenchrus setiger</i> (Birdwood Grass)	High	High	High	High	Rapid	Increasing	Established	Low
* <i>Citrullus colocynthis</i> (Colocynth)	Low	Low	Low	Low	Rapid	-	-	Low
* <i>Cucumis melo</i> subsp. <i>agrestis</i> (Ulcardo Melon)	To Be Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed
* <i>Datura leichhardtii</i> (Native Thornapple)	Moderate	Low	Medium	Low	Slow	-	-	Unknown
* <i>Euphorbia hirta</i> (Asthma Plant)	Moderate	Low	Low	Low	Slow	-	-	High
* <i>Flaveria trinervia</i> (Speedy Weed)	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed

Species	Environmental Weed Strategy Rating (Low, Mild, Moderate, High)	Ecological Impact (Low, Moderate, High, Unknown)	Current Distribution (Low, Moderate, High, Unknown)	Potential Distribution (Low, Moderate, High, Unknown)	Invasiveness (Rapid, Moderate, Slow)	General Trend (Increasing, Stable, Decreasing, Unknown)	Status (Outside, Emerging, Established, Unknown)	Feasibility for Control (Low, Moderate, High, Unknown)
* <i>Malvastrum americanum</i> (Spiked Malvastrum)	Moderate	High	High	Low	Rapid	Increasing	Established	Low
* <i>Portulaca oleracea</i> (Purslane)	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed	Not Assessed
* <i>Setaria verticillata</i> (Whorled Pigeon Grass)	Low	High	Moderate	Low	Rapid	Rapid	Established	Low
* <i>Sisymbrium orientale</i> (Indian Hedge Mustard)	Moderate	Low	Low	Unknown	Unknown	-	-	Unknown
* <i>Sonchus oleraceus</i> (Common Sowthistle)	Moderate	Low	High	Low	Rapid	-	-	Low
* <i>Vachellia farnesiana</i> (Mimosa Bush)	High	High	High	Low	Rapid	Stable	Established	Low

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