Pilbara Flora

ABN 641 460 857 40

Vegetation Surveys

Clearing Permits

Rehabilitation

Flora and Vegetation Survey of the Goldsworthy Minesite

Prepared for BHP Billiton Iron Ore Pty Ltd by Pilbara Flora

October 2008

(Revised January 2009)

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Cover Page: View looking east across the Goldsworthy Pit

Preface

This report was originally prepared in October 2008. The Department of Environment and Conservation ('DEC') commenced a review of all conservation flora in Western Australia in October 2008. The review is continuing (currently January 2009) however an interim list of revised conservation flora has been provided to Pilbara Flora by DEC. Various changes have been made to the conservation status of flora and as result, the flora recorded in this report have been checked against the interim list from DEC. There are no changes to the conservation status of flora that will affect any species recorded in this report.

Executive Summary

The Mount Goldsworthy Mine ('Goldsworthy') was the first major iron ore development in the Pilbara, operating for 27 years from 1965 to 1992. The Goldsworthy mine and mining tenements are held by the Mount Goldsworthy Mining Associates Joint Venture partners with BHP Billiton Iron Ore Pty Ltd ('BHPBIO') managing Goldsworthy on behalf of the joint venture partners.

Goldsworthy is located approximately 97km east from Port Hedland and approximately 30km inland from the coast. The minesite and associated infrastructure consisted of a main open cut pit approximately 1200m long by 500m wide and 200m deep, various waste dumps, an ore processing plant, railway infrastructure to Port Hedland and a 1000 person mining town. The entire Goldsworthy mine area and townsite was rehabilitated by BHP between 1992 and 1993. Rehabilitation involved the removal of all redundant infrastructure, reshaping and moonscaping of waste dump batters, ripping of flat areas and reseeding with native vegetation species.

Rehabilitation was considered as best practice at the time with significant resources and expertise being deployed by BHP at Goldsworthy. However, over the years it has become apparent that rehabilitation has had limited success in some areas. BHPBIO is developing a remediation plan for Goldsworthy to address all outstanding requirements for closure and decommissioning. To facilitate the access of heavy earthmoving machinery into areas proposed for rehabilitation or mining, clearing of native vegetation will be required. Under the *Environmental Protection Act 1986* land clearing legislation, a native vegetation clearing permit ('NVCP') is required for areas where native vegetation will be cleared.

To facilitate the NVCP application, BHPBIO commissioned Pilbara Flora to conduct a flora and vegetation survey of Goldsworthy. Pilbara Flora conducted a 'Level 2'[1] flora and vegetation survey using 50m x 50m quadrats in June 2008. In addition to the Level 2 survey, a GPS point survey was also undertaken to map vegetation and to search for rare and priority species.

The flora and vegetation survey was conducted over a total area of 1236ha. However, 512ha had been disturbed by previous mining activities, thus leaving 724ha remaining as native vegetation. These areas are listed below:

Landform	Area (ha)
Native Vegetation	724
Disturbed Ground	512
Total	**1236**

[1] *With reference to the EPA Guidance Statement No. 51 "Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia" (EPA 2004).*

A total of 188 vascular taxa from 88 genera and 40 families were recorded from the vegetation survey area. Five families dominated in terms of taxa numbers; these being Poaceae, Papilionaceae, Mimosaceae, Malvaceae and Amaranthaceae. Taxa from Tiliaceae, Euphorbiaceae, Myrtaceae, Caesalpiniaceae, Convolvulaceae, Proteaceae and Asteraceae were also dominant but to a lesser extent.

From the limited number of vegetation surveys available for the Goldsworthy area, it would appear that the floristic diversity in the Goldsworthy region is less than in other areas of the Pilbara. The total species count of 188 taxa from the Pilbara Flora survey was considered as being representative of a typical floristic diversity for the Goldsworthy region.

Four main landforms were observed within the vegetation survey area, these being; Hills, Sandplains, Drainage Lines and Disturbed Ground. Nineteen vegetation types and nine mining disturbed landforms were recorded within the Goldsworthy site. Areas under rehabilitation were assessed as having vegetation communities that could not be considered as vegetation. Rehabilitated areas had major dissimilarities to native vegetation in structure, floristic composition and extent of weed occurrence. The vegetation types at Goldsworthy are contained within the mining lease boundaries of a large and historical iron ore mine and townsite. Many areas of native vegetation were considered as having low to moderate conservation value due to the impact from mining activities. There were no vegetation types or landscape units identified that were considered as being rare, restricted or unique.

No Declared Rare Flora species pursuant to Section 23F (2) of the *Wildlife Conservation Act 1950*, as listed by DEC, were found within the vegetation survey area of Goldsworthy during the Pilbara Flora survey.

One species listed as a Priority 2 conservation taxa by DEC, *Euphorbia clementii*, was recorded within the vegetation survey area at Quadrat 10. Quadrat 10 is located on gravelly sand plains immediately south of the southernmost waste dump (known as Bill Goat Dump). The number of individuals of *Euphorbia clementii* was not recorded but it was assigned a cover index of less than 1%. *Euphorbia clementii* was not recorded elsewhere in the vegetation survey area.

Although *Euphorbia clementii* is a Priority 2, it has been recorded in the Northeast Pilbara from a rectangular area approximately 100 by 120km (Wodgina to Marble Bar to Yarrie to De Grey River). This species is not a short range endemic. The conservation status of *Euphorbia clementii* should therefore not be significantly impacted by the proposed activities at the Goldsworthy

Five introduced species were recorded within the vegetation survey area, these being:

- *Aerva javanica* – Kapok
- *Calotropis procera* - Calotropis
- *Cenchrus ciliaris* – Buffel Grass
- *Tamarix aphylla* - Athel Pine
- *Vachellia farnesiana* – Mimosa Bush

Buffel Grass (*Cenchrus ciliaris*) infestations were significant within the Goldsworthy townsite and areas of rehabilitated infrastructure. The other introduced species were at background levels and were not observed as weed infestations.

Two introduced species, *Tamarix aphylla* and *Calotropis procera,* are Declared Plants under the *Agriculture and Related Resources Protection Act 1976* (APB 2007). *Tamarix aphylla* is a Category 1 Declared Plant for the whole of Western Australia. *Calotropis procera* is a Category P1 and P2 Declared Plant in the Town of Port Hedland and the Shire of East

Pilbara. A single *Calotropis procera* individual was recorded on a Goldsworthy waste dump. Several *Tamarix aphylla* plants were observed near the creekline that runs along the southern boundary of the old Goldsworthy townsite. Both of these declared plants have control and eradication requirements under the provisions of the *Agriculture and Related Resources Protection Act 1976.*

1 Introduction

The Mount Goldsworthy Mine ('Goldsworthy') was the first major iron ore development in the Pilbara, operating for 27 years from 1965 to 1992. Goldsworthy is located approximately 97km east from Port Hedland and approximately 30km inland from the coast (Figure 1).

Goldsworthy consisted of a main open cut pit approximately 1200m long by 500m wide and 200m deep, various waste dumps, an ore processing fixed plant, railway infrastructure to Port Hedland and a 1000 person mining town.

The entire Goldsworthy mine area was rehabilitated by BHP between 1992 and 1993. Rehabilitation involved the removal of all redundant infrastructure, reshaping and moonscaping of waste dump batters, ripping of flat areas and reseeding with native vegetation.

Goldsworthy was the first major minesite to be decommissioned for closure in the Pilbara. At the time, rehabilitation was considered to be best practice with significant resources being deployed by BHP. However, over the years it has become apparent that rehabilitation has had limited success in some areas for a number of reasons (ENV 2007).

Goldsworthy is owned by the Mount Goldsworthy Mining Associates Joint Venture partners (see Table 1). BHP Billiton Iron Ore Pty Ltd ('BHPBIO') manages Goldsworthy on behalf of the joint venture partners.

BHPBIO develops decommissioning and closure plans for all of its operations and this includes older sites such as Goldsworthy. ENV Australia Pty Ltd was commissioned by BHPBIO in 2006 to undertake an ecological assessment of the Goldsworthy waste dump rehabilitation (ENV 2007). Rehabilitation was found to be variable and patchy. A range of environmental factors were identified as causatives for poor vegetation return; these including: soil structure, substrate type, weed infestation, salinity, low pH and steepness of outslope angles (ENV 2007).

BHPBIO is developing a remediation plan for Goldsworthy to address all outstanding requirements for closure and decommissioning. The remediation plan will most likely require reworking of waste dumps and other rehabilitated areas. Additionally, some areas within Goldsworthy have potential for further mining or reprocessing. To enable access of heavy earthmoving machinery into areas proposed for rehabilitation or mining, clearing of native vegetation will be required. Under the *Environmental Protection Act 1986* land clearing legislation, a native vegetation clearing permit ('NVCP') is required for areas where native vegetation will be cleared.

To facilitate the NVCP application, BHPBIO commissioned Pilbara Flora to conduct a flora and vegetation survey of Goldsworthy. The results of the survey are presented in this report.

1.1 Purpose of this Report

The purpose of this report is to:

- Provide information on flora and vegetation communities occurring at Goldsworthy for use in environmental management and rehabilitation planning;
- Provide floristic and vegetation information to aid in the assessment and determination of an NVCP application for Goldsworthy, and
- Provide floristic and vegetation information for inclusion in any future mining proposals.

1.2 Vegetation Survey Area

In this report, the area surveyed by Pilbara Flora is known as the 'vegetation survey area'. The vegetation survey area covers 1236ha and is contained within mining tenements held by the Mount Goldsworthy Mining Associates Joint Venture partners (Figure 2, Table 1). The vegetation survey area polygon was provided to Pilbara Flora by BHPBIO as an Arcview shapefile.

Goldsworthy operated in the period immediately prior to the advent of the modern environmental legislation which now regulates the mining industry. During this pre-regulation era, the minimisation of disturbances was not a priority. A considerable amount of ground within the vegetation survey area was found by Pilbara Flora to have been disturbed by previous mining activities and associated infrastructure. Many areas that had been rehabilitated were still categorised as disturbed ground as the re-established vegetation was patchy in occurrence and dissimilar to surrounding native vegetation.

The areas of native vegetation and disturbed ground within the vegetation survey area as determined by the Pilbara Flora field survey are outlined below:

- Native Vegetation - 724ha (58.6%); and
- Disturbed Areas - 512ha (41.4%).

Hence, 724ha was mapped as native vegetation from the total area of 1236ha.

BHPBIO will submit an NVCP application directly to the Department of Industry and Resources ('DoIR') using this report as a supporting document. The exact area of native vegetation required for clearing will be specified by BHPBIO in the NVCP application for Goldsworthy.

2 Background Information

2.1 Location

Goldsworthy is located at the northeastern extremity of the Pilbara region and is adjacent to the start of the Canning Basin. The Canning Basin occurs approximately 8km to the east of Goldsworthy (GSWA 2008). The Goldsworthy mine is situated within the Ellarine Ranges and the townsite and rail infrastructure are located on alluvial plains to the north of the ranges. The site layout is provided in Figure 2. Apart from the decommissioned mining and townsite infrastructure, the Goldsworthy site also contains operational infrastructure associated with other sites. The BHPBIO Yarrie railway, BHPBIO railway access road and the Newcrest Mining Ltd Telfer gas pipeline are located to the north of the Goldsworthy mine and townsite (Figure 2). The nearest regional centres are Port Hedland 99km to the east, Pardoo Roadhouse 43km to the northeast and Marble Bar 93km to the south.

2.2 Land Tenure

Goldsworthy is contained within crown land but with various concurrent land tenures. Land tenures occurring within or near the vegetation survey area are outlined in Table 1.

Table 1: Land Tenure

Tenure for Goldsworthy	Holder / Vestee
State Agreement Act Mining Lease ML235SA	Mt Goldsworthy Mining Associates Joint Venture partners:[2] • BHP Billiton Minerals Pty Ltd (85%) • Mitsui Iron Ore Corporation Pty Ltd (7%) • Itochu Minerals and Energy of Australia Pty Ltd (8%)
Mining Act tenements G45/278 (L45/115 and L45/116)	Mt Goldsworthy Mining Associates Joint Venture partners
L45/110 Telfer gas pipeline	Newcrest Mining Ltd
Crown Reserve 9700 De Grey Peak Hill Stock Route – eastern section of ML235	Department of Planning and Infrastructure
Pardoo Station	John Leeds Nominees Pty Ltd
De Grey Station (south of ML235SA)	John Bettini
Shire of East Pilbara	Local Government
Town of Port Hedland (very western edge of old townsite)	Local Government

The entire Goldsworthy site is contained within State Agreement Act Mining Lease ML235SA and Mining Act tenements G45/278 (L45/115 and L45/116) [3]. Goldsworthy operates under the *Iron Ore (Goldsworthy) Agreement Act 1964.*

[2] *BHPBIO manages Goldsworthy on behalf of the joint venture partners.*

[3] *L45/115 and L45/116 are miscellaneous licence applications that occur over the same area as general purpose lease application G45/278.*

2.3 Schedule 1 and Conservation Areas

The proximity of Schedule 1[4] and conservation areas in relation to Goldsworthy was assessed using Tengraph (DoIR 2008), Natmap (Geoscience Australia 2005), the DEC Native Vegetation Map Viewer (DEC 2008a) and Arcview GIS with shapefiles provided by Department of Water ('DoW') for Public Drinking Water Source Areas (DOW 2008) and DEC for Schedule 1 Areas (land clearing legislation), National Parks Nature Reserves and Threatened/Priority Ecological Communities (DEC 2007 and English 2008). Table 2 shows the closest conservation and Schedule 1 areas in relation to Goldsworthy.

Table 2: Closest Schedule 1 and conservation areas to Goldsworthy

Conservation / Schedule 1 Area	Status	Distance from Goldsworthy
De Grey Water Reserve – Public Drinking Water Source Area	Schedule 1	0km and immediately to the southwest
De Grey River riparian areas	ESA[5]	8km to the southwest
Mungaroona Range Nature Reserve	Schedule 1 and ESA	175km to the southwest
Karjini National Park	Schedule 1 and ESA	250km to the southwest

From the spatial information searches, there are no National Parks, Threatened Ecological Communities, Priority Ecological Communities or Nature Reserves in the Goldsworthy area. The closest ESA is the riparian zone along the De Grey River, 8km southwest of Goldsworthy.

Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004,* all water reserves are classed as Schedule 1 Areas. The De Grey Water Reserve is a Schedule 1 Area that occurs over a large section of land east of Port Hedland. The entire Goldsworthy mining lease ML235SA has been included in the De Grey Water Reserve and hence Goldsworthy is now under a Schedule 1 Area. A NVCP is thus required for mining related clearing occurring within the Goldsworthy tenement ML235SA.

[4] Schedule 1 Areas are areas within Western Australia where mining and exploration activities require a native vegetation clearing permit pursuant to 'Schedule 1 — Low impact or other mineral or petroleum activities' under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004.

[5] ESA = 'environmentally sensitive area' as proclaimed under the Environmental Protection Act 1986. ESAs are included within Schedule 1 Areas.

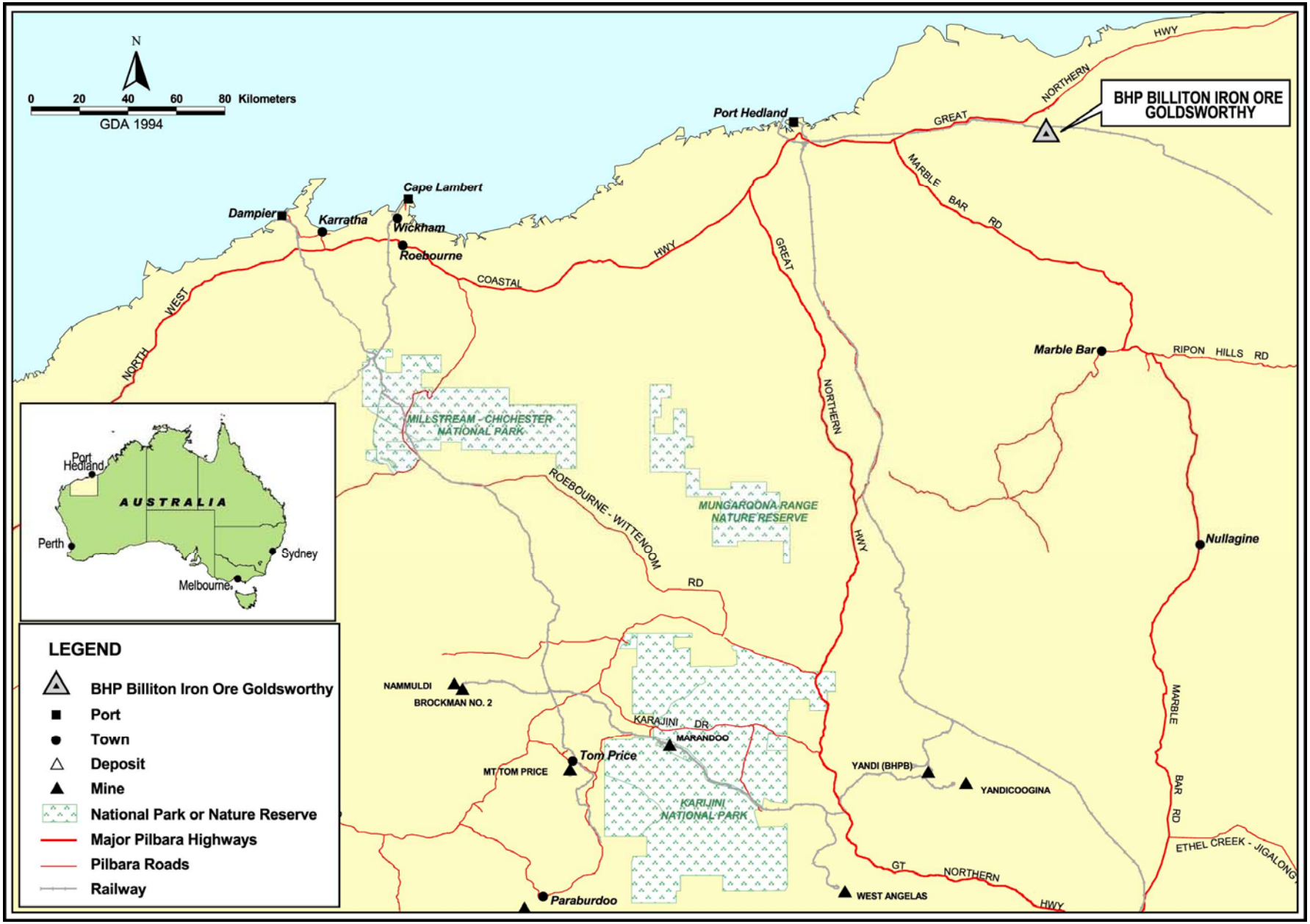

Figure 1: Regional location of Goldsworthy

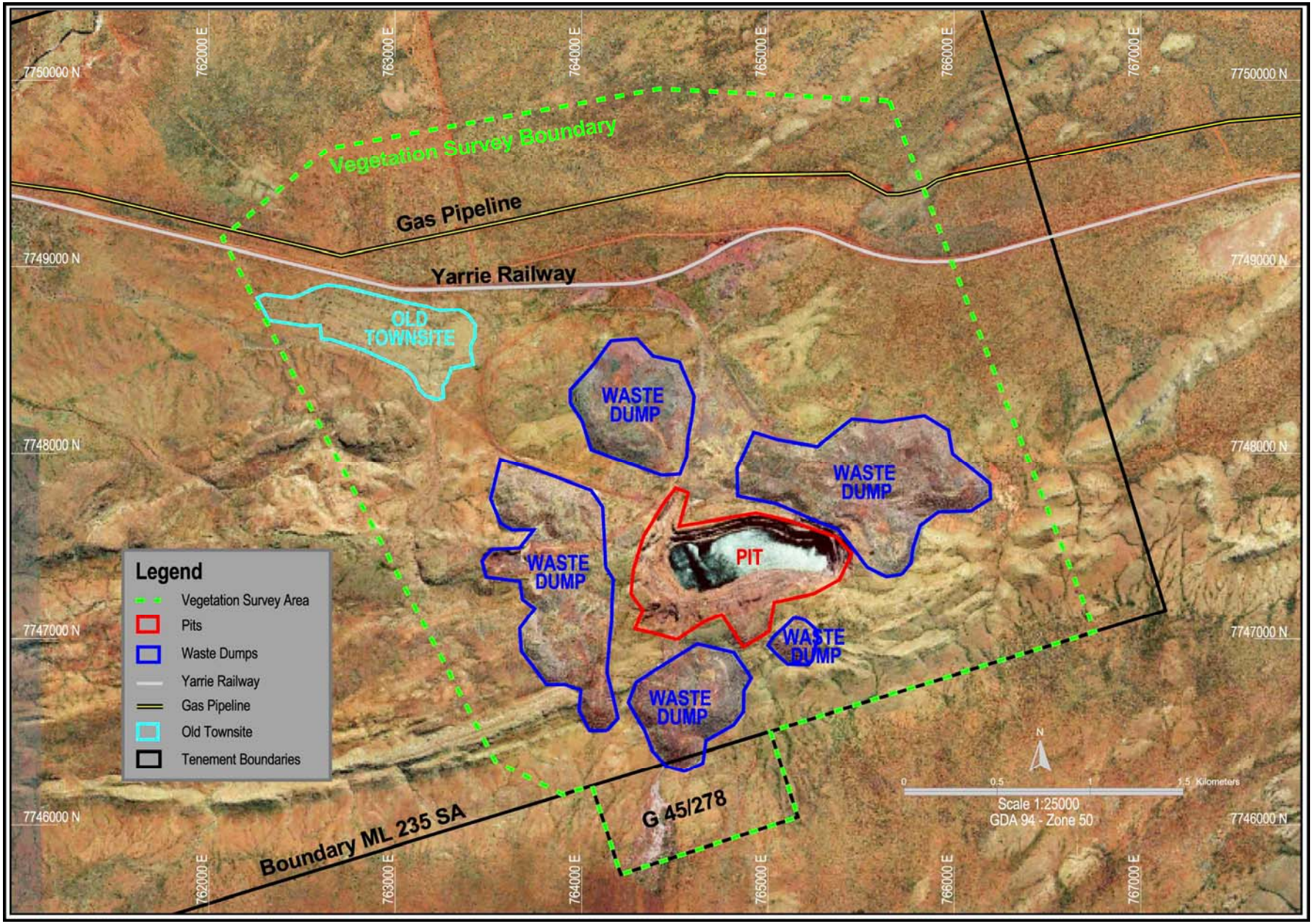

Figure 2: Layout of Goldsworthy Minesite

2.4 Climate and Seasonality

The closest full weather station with extended records to Goldsworthy is the Bureau of Meteorology ('BOM') Port Hedland Airport (BOM Station # 4032). The Port Hedland Airport is approximately 92km from Goldsworthy. Weather was recorded at Goldsworthy (BOM Station # 4074) for 26 years from 1966 to 1992 and appears comparable to the Port Hedland data (Figure 3). Therefore, the Port Hedland weather data is considered suitable for use in relation to Goldsworthy. Weather data from the Port Hedland Airport is presented in Table 3.

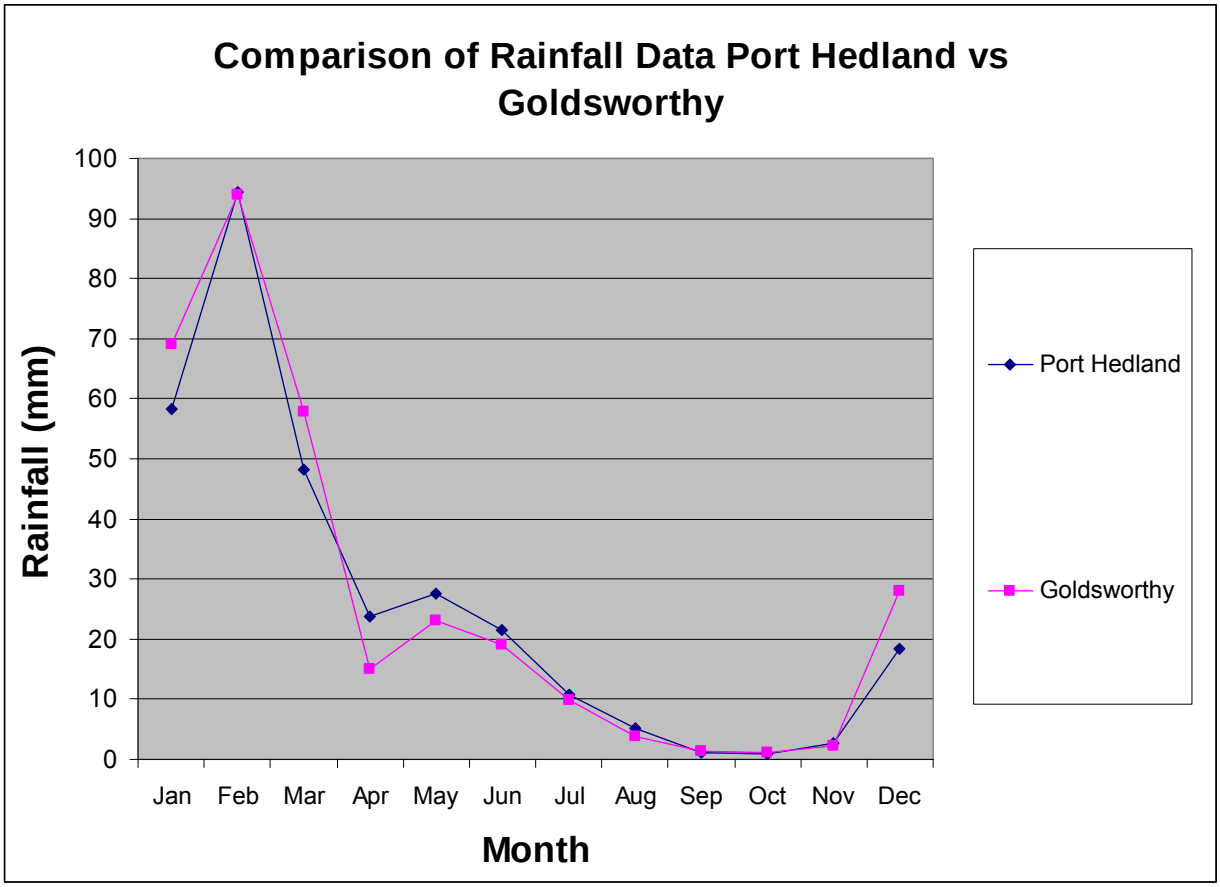

Figure 3: Comparison of mean monthly rainfall data between Port Hedland and Goldsworthy

The climate of the Goldsworthy region is semi-arid, hot and mostly dry, with an average annual rainfall of 347mm at Goldsworthy and 312mm at the Port Hedland Airport. Most rainfall occurs generally in the summer rain season from December to June with occasional major deluge events from cyclones. The highest daily rainfall event was 387.1mm recorded on 27 January 1967 (BOM 2008). Scattered thunderstorms provide the majority of non-cyclonic rain and an average of 15 to 20 thunderstorms occur each year, mostly during summer. Infrequent and unreliable winter rain also occurs. Daily temperatures are often greater than 40°C for extended periods during summer. Annual evaporation in the De Grey River area is about 2.5m (BOM 2008).

Massive rainfall is associated with the summer cyclone season. These large rainfall events can result in flash flooding and extensive overland flooding. Watercourses are generally dry for most of the year and only flow after significant rainfall events. Creek flows subside

rapidly, often within a few days to a week. River systems can flow for several weeks to a month before drying up. Water, however, is retained in waterholes along watercourses and in rock pools in gorges for many months into the dry season.

Seasonality can have a large influence on the effectiveness of a vegetation survey. The 12 month period leading up to the vegetation survey was very dry (120.8mm) compared to the annual average of 213mm (Table 4 and Figure 4). There was, however, rain in the summer period from January to April 2008 (110mm) and the 2007 rainfall year (January to December 2007) was well above average due to massive rainfall in March 2007 (427.2mm at Port Hedland). The summer rainfall and the March 2007 massive rainfall may have offset the poor season effect to a large extent and this was evidenced by the verdant and healthy condition of vegetation at Goldsworthy observed during the Pilbara Flora survey.

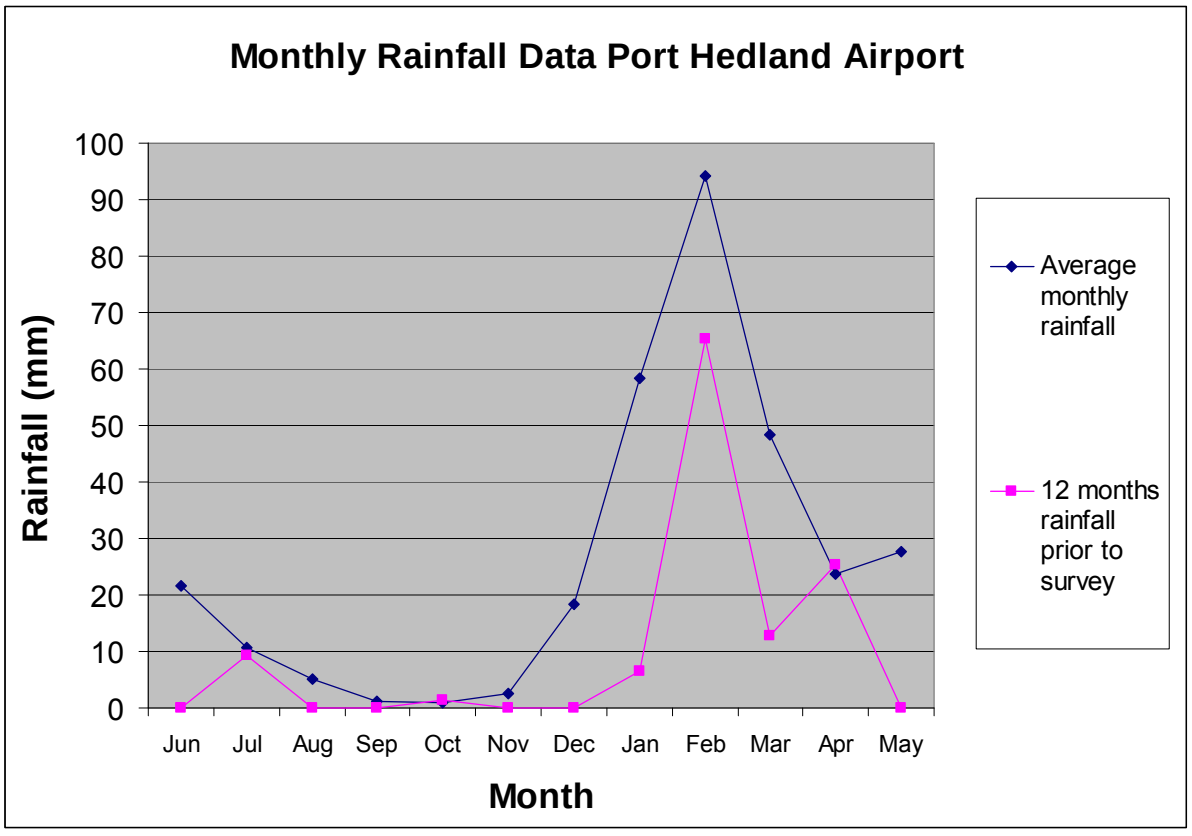

Figure 4: Average rainfall compared to 12 months prior to vegetation survey

Table 3: Climatic Information for Port Hedland Airport

Statistic Element*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum temperature (°C)	36.4	36.2	36.8	35.2	30.6	27.5	27.1	29.1	32.2	34.7	36.2	36.6	33.2
Highest temperature (°C)	49	48.2	45.9	42.4	38.8	35.5	34.4	36.8	42.2	46.9	47.4	47.9	49
Lowest maximum temperature (°C)	26	25.6	25.8	20.6	17.2	16	15.6	16.5	24.4	25	24.6	26.7	15.6
Lowest temperature (°C)	18.1	16.3	15.8	12.2	7	4.7	3.2	3.7	7.7	11.1	12.4	16.6	3.2
Mean rainfall (mm)	58.3	94.3	48.3	23.7	27.6	21.6	10.7	5.1	1.2	0.9	2.6	18.3	312
Highest rainfall (mm)	454	360	427	352	170	129	80.5	58.6	27.4	8.2	66.8	219	627
Lowest rainfall (mm)	0	0	0	0	0	0	0	0	0	0	0	0	44.5
Highest daily rainfall (mm)	387	329	157	117	156	128	73.2	34.6	19	7.4	59.4	169	387
Mean number of days of rain	4.8	7	4.2	1.9	3	2.8	1.9	1.1	0.7	0.7	0.5	1.8	30.4
Mean daily evaporation (mm)	10.5	9.6	9.3	8.7	7.4	6.5	6.6	7.5	8.9	10.6	11.4	11.4	2500

Table 4: Previous 12 months of rainfall compared to monthly average

Statistic Element*	2007							2008					
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Annual
Mean monthly (mm)	21.6	10.7	5.1	1.2	0.9	2.6	18.3	58.3	94.3	48.3	23.7	27.6	312.3
Rainfall in past 12 months (mm)	0	9.4	0	0	1.4	0	0	6.4	65.4	12.8	25.4	0	120.8

***** Data from the Bureau of Meteorology website: www.bom.gov.au for Port Hedland Airport BOM station # 4032 from 1942 to 2008 (BOM 2008).

2.5 Geology

The Goldsworthy mining areas are located within the mixed Archaean rock type called the Gorge Creek Group, consisting of undivided banded iron-formation and metamorphosed siliciclastic sedimentary formation (GSWA 2008). These formations constitutes the Ellarine Ranges

The sandplains to the north of the Ellarine Ranges are part of the Grey Supergroup, consisting of siliciclastic sedimentary and metamorphosed formations (GSWA 2008).

The sandplains to the south of the Ellarine Ranges are part of the Warrawoona Group, consisting of mafic, ultramafic, felsic volcanic and intrusive rocks and sedimentary metamorphosed rocks (GSWA 2008).

2.6 Hydrogeology

The Ellarine Ranges consists of shale, volcanic rocks and banded iron-formations with extensive fracturing and faulting (Johnson and Wright 2003). The vuggy hematite orebody itself constituted the aquifer which is more permeable than the surrounding parent rock. Since completion of mining in 1982, a pit lake has formed, with water levels rising at a rate of 2.1m/y and salinity at a rate of 200mg/L/y (Johnson and Wright 2003). The mine void extended 180m below the pre-mining watertable. At the cessation of mining, salinity levels ranged from 1400 to 2000mg/L with current salinity in excess of 5500mg/L TDS (Johnson and Wright 2003).

2.7 Surface Hydrology

The Ellarine Range is the prominent topographical feature, surrounded by extensive areas of low relief alluvial red sand plains. Runoff from the mine is caught internally to some extent and is directed back towards the pit. Some runoff leaves site or is trapped in mine drainage ponded areas.

The major regional watercourse is the De Grey River occurring approximately 8km to the southwest of Goldsworthy. The direct catchment from Goldsworthy is Pardoo Creek, located approximately 4km to the southwest. Pardoo Creek flows past the mine and then for approximately 30km north to the coast. A small un-named creek runs directly from the central Goldsworthy waste dump past the townsite west into Pardoo Creek.

2.8 Botanical Province

Goldsworthy is situated towards the north-eastern corner of the Pilbara Region Eremaean Botanical Province, at the boundary of the Fortescue and Canning Botanical Districts and adjacent to the Great Sandy Desert Region (Beard 1990). Beard categorises the vegetation types of the Goldsworthy area as tree-steppes and shrub-steppes dominated by *Eucalyptus leucophloia* or *Acacia pyrifolia* over *Triodia pungens* grasslands.

2.9 Land Systems

With reference to the Department of Agriculture and Food's land system mapping, the vegetation survey area occurred over three land systems; these being Nita, Capricorn and Boolgeeda (Van Vreeswyk *et al*. 2004). Information on these land systems is provided in Table 5, Figure 5 and Plates 1, 2 and 3.

Table 5: Land types and land systems within the survey area

Land System	Land System Description*	Extent within Pilbara (ha)	Vegetation Survey Area (ha)	% of Vegetation Survey Area
Nita	Sandplains supporting shrubby spinifex grasslands with occasional trees.	1,125,000	363	29.3
Capricorn	Hills and ridges of sandstone and dolomite supporting low shrublands or shrubby spinifex grasslands.	529,600	503	40.7
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	774,800	24	2.0
Mining Areas			346	28.0
Total			**1236**	**100**

*Adapted from Van Vreeswyk *et al.* (2004).

Plate 1: Nita Land System at Goldsworthy

Plate 2: Capricorn Land System at Goldsworthy

Plate 3: Boolgeeda Land System at Goldsworthy

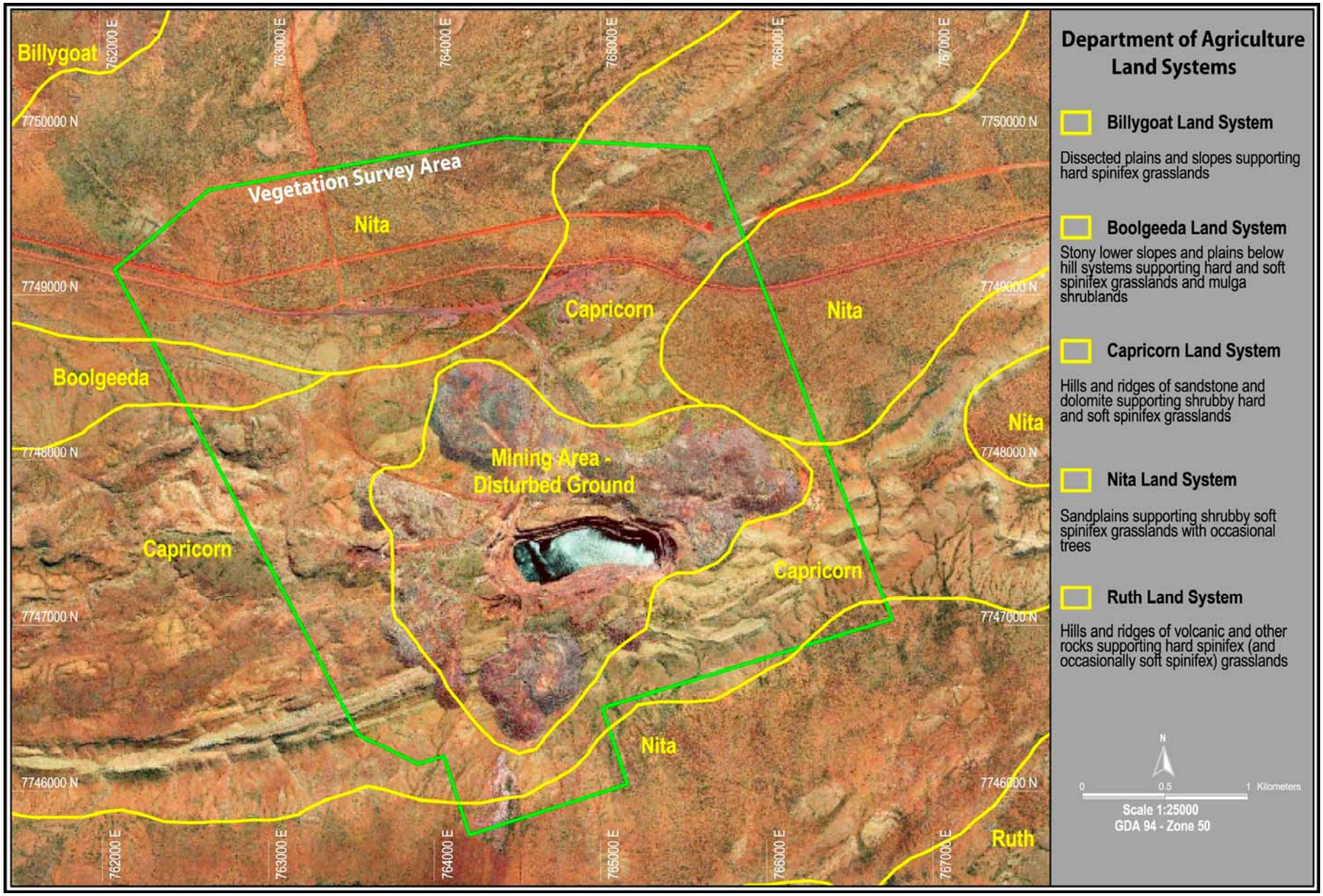

Figure 5: Land Systems at Goldsworthy

2.10 IBRA Subregion and Biodiversity

Under the Interim Biogeographical Revision of Australia ('IBRA'), the Pilbara has been divided into four subregions. The vegetation survey area is contained primarily within PIL1 Chichester Subregion with the southwest corner extending into the PIL4 Roebourne Subregion (DEC 2007). The IBRA subregions are described in detail in 'A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002' (May and McKenzie 2002).

The PIL1 Chichester Subregion comprises the northern section of the Pilbara Craton with undulating Archaean granite sand basalt plains including significant areas of basaltic ranges (Kendrick and McKenzie 2001). The granite sand basalt plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands with *Eucalyptus leucophloia* tree steppes on the basaltic ranges (Kendrick and McKenzie 2001). The Goldsworthy area contains both granitic sand plains and Archaean ranges.

With regards to biodiversity within the PIL1 Chichester Subregion:

- There are no known true 'refugia' sites in PIL1;
- Hummock grassland fauna communities and the cracking clay communities of the Chichester Range of the Mungaroona Range are recognised as areas of high species and ecosystem diversity;
- Rare flora species of subregional significance include *Livistona alfredii* populations in the Chichester escarpment;
- The De Grey River is listed as a Wetland of National significance;
- Carawine Gorge, Running Waters and Skull Springs are listed as Wetlands of Subregional Significance; and
- There are no Threatened Ecological Communities ('TECs') in PIL1 (Kendrick and McKenzie 2001).

The PIL4 Roebourne Subregion comprises quaternary alluvial and older colluvial coastal and subcoastal plains with mixed tussock and hummock grasslands (sometimes with dwarf shrub steppe of *Acacia stellaticeps* or *Acacia pyrifolia* and *Acacia inaequilatera*), uplands dominated by *Triodia* hummock grasslands, coastal samphire areas and islands of granite or sand accumulations (Kendrick and Stanley 2001).

With regards to biodiversity within the PIL4 Roebourne Subregion:

- Refugia areas included the Burrup Peninsula, offshore islands and basalt rockpiles;
- The Burrup Peninsula is an area of botanical habitat diversity;
- The De Grey River and Port Hedland Saltfields are listed as Wetlands of National significance;
- Permanent pools of the Turner, Yule, Sherlock, Harding, Maitland and Fortescue Rivers, mangrove areas and the Cane River swamp are listed as Wetlands of Subregional Significance; and
- No TEC's occur in PIL4 (Kendrick and Stanley 2001).

There are no areas with high biodiversity and associated significant conservation values listed by DEC in their 2002 biodiversity audit for either the PIL1 Chichester or PIL4 Roebourne Subregions for the Goldsworthy area.

2.11 Flora

A desktop review was conducted for information on rare and priority flora that could potentially occur near Goldsworthy and surrounding areas. Information was obtained from:

- DEC Threatened Flora Database; and
- previous vegetation surveys.

The DEC search was undertaken over a rectangular area approximately 42.4km by 41.5km centering on Goldsworthy (DEC 2008b). The search co-ordinates used were 20º 10'S to 20° 33'S and 119 18'E to 119° 42'E (GDA94).

The DEC search results were obtained from DEC's Threatened (Declared Rare) Flora database, the Western Australian Herbarium Specimen Database for priority species opportunistically collected in the Goldsworthy area and the DEC's Declared Rare and Priority Flora List using a search on 'place names'. The DEC rare flora search information is presented in Appendix A. Four conservation taxa were listed by DEC for the Goldsworthy area (Atkins 2008), these being:

- *Acacia glaucocaesia* (Priority 3);
- *Bulbostylis burbidgeae* (Priority 3);
- *Mimulus clementii* (Priority 1); and
- *Phyllanthus aridus* (Priority 3).

Abutilon trudgenii was listed on the Western Australian Herbarium Specimen Database but was delisted as a priority species in 2008 (Atkins 2008).

No Declared Rare Flora, as proclaimed under the *Wildlife Conservation Act 1955,* were listed by DEC for the Goldsworthy area.

Priority 1 and Priority 3 species definitions from DEC's Florabase (Florabase 2008) are:

- P1: Priority One - Poorly Known: 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.
- P3: Priority Three - Poorly Known: Taxa which are known from several 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 need of further survey.

2.12 Environment Protection and Biodiversity Conservation Act 1999

A search was conducted using the Department of Environment and Water Resources' "Protected Matters Search Tool" for listings under the *Environment Protection and Biodiversity Conservation Act 1999* ('EPBCA'), centred on Goldsworthy with a 25km buffer (DEWHA 2008a). The EPBCA search results are provided in Table 6.

Table 6: EPBCA online search tool for Goldsworthy with 25km buffer

Matters of National Environmental Significance			
Search Type:	Point	**Centroid:**	-20.35305S,119.5352E
Buffer:	25km	**Area:**	1963km^2
Biodiversity			
Threatened Species (all listings are for fauna species):			6
Threatened Ecological Communities:			None
Heritage			
World Heritage Properties:			None
National Heritage Sites:			None
Wetlands			
Ramsar Wetlands (Internationally important):			None
Nationally Important Wetlands:			None
Protected Areas			
Reserves and Conservation Areas:			None
Regional Forest Agreements:			None

There were no EPBCA listings for threatened flora species (all threatened species listed are fauna), Threatened Ecological Communities, World Heritage Properties, National Heritage Sites, Ramsar Wetlands, Nationally Important Wetlands, Reserves and Conservation Areas, and Regional Forest Agreements for the Goldsworthy area.

3 Vegetation Survey

3.1 Survey Methodology

The field survey was undertaken between 10 and 20 June 2008 by botanist Dr Chris Hancock and arid zone ecologist Charles Newland. With reference to the EPA Guidance Statement No. 51 "*Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia"* (EPA 2004), a 'Level 2' equivalent flora and vegetation survey was conducted. In addition to Level 2 survey requirements, a GPS point survey was also undertaken to assist with mapping vegetation communities and to search for rare and priority species.

The field survey was conducted by traversing the entire vegetation survey area on foot. Vegetation communities were differentiated visually and were mapped using GPS point survey and 50 x 50m quadrats. Vegetation and floristic data collected for quadrats included: species presence, height and percentage cover, general information on soil, landform and community structure, GPS coordinates and a 'north-east-south-west' photo series. For creeklines where a 50 x 50m area was not possible, traverses were made for approximately 100m along the creekbed. The GPS point survey method involved collecting the same information as for the quadrat data except that a 50 x 50m quadrat was not marked out. The GPS point survey method is quicker and enables larger areas to be surveyed in a much shorter timeframe. Both the quadrat and GPS point survey methods were combined to map vegetation communities at Goldsworthy. In total, information was collected from 50 quadrats and 197 GPS survey points. The locations of the vegetation survey quadrats and GPS survey points are provided in Figure 6.

Significant areas within the southeast corner of Goldsworthy had been burnt very recently with almost total removal of vegetation (Plate 4 and Figure 6). There was insufficient vegetative material remaining to conduct a vegetation survey. Landform data was recorded from these burnt areas and used in interpretive vegetation mapping based on similarities to known landscape and substrate types. Where possible, remnant patches of vegetation within burnt areas were surveyed. The landscape and remnant floristic information was considered sufficient to estimate vegetation types occurring at this burnt location.

Vegetation structure and condition were recorded using Trudgen's Pilbara vegetation structural classification system and condition rating system (Appendix B, Trudgen 2001).

All taxonomies were determined by Sharnya Thomson in consultation with Malcolm Trudgen for problematic taxa.

3.2 Limitations of Vegetation Survey

Various factors can limit the effectiveness of a vegetation survey. Pursuant to EPA Guidance Statement 51, these factors have been identified and assessed (Table 7).

Table 7: Potential limitations affecting the vegetation survey

Potential limitations	Constraint	Comment
Competency and experience of the botanists undertaking the survey	No	Dr Chris Hancock has 10 years experience as a taxonomic and field botanist and has worked on many Pilbara vegetation projects. Charles Newland is a mining environmental scientist and ecologist with 25 years experience with Pilbara, Kimberley and Northern Territory flora. Charles has worked exclusively for the past 3 years undertaking vegetation surveys in the Pilbara region.

Potential limitations	Constraint	Comment
Spatial uncertainty	No	A map of the survey area was created using GIS and then downloaded into the GPS unit (Magellan Explorist XL with colour screen). This enables the location of the observer to be viewed on the GPS screen map, thus removing any spatial uncertainty. The field personnel are very experienced in the use of this system for field work. GPS points were also checked against known survey points such as mining lease survey posts and road alignments to check for spatial error. The GPS unit was found to be very accurate on field days.
Seasonality and proportion of flora identified during survey	Partial	The survey occurred mid-year following a below average rainfall year (Section 2.4). It is expected that some spring flowering annuals and rainfall dependent annuals may not have been present during the survey period. However, some rain fell across the summer months and this may have offset the poor rainfall year to some extent.
Adequate ground coverage and intensity of survey effort	No	The effective survey area was 724ha which averages approximately 36ha surveyed per person per field day. It is considered that ground coverage and survey intensity was adequate.
Disturbance in survey area	No	Much of the vegetation survey area had some form of mining disturbance. This site had been a major mining operation for 27 years. A large proportion of the vegetation survey area had been partial disturbed, or had regrowth, rehabilitation or no vegetation at all. All disturbed areas were excluded from the vegetation survey.
Burn Cycle	Partial	Recent fires had occurred in late 2007 and early 2008 affecting large areas of the vegetation survey area. Where possible, an unburnt surrounding area that appeared to have similar vegetation was surveyed. All other areas had not been burnt for 3 to >5 years and had developed to either a mid-burn cycle or to a mature vegetation stage. The southeastern section of the vegetation survey area had insufficient vegetation due to a very recent fire to conduct a vegetation survey (Plate 4 and Figure 6).
Resources	No	Adequate resources were available to conduct the survey.
Access restrictions	No	There were no access restrictions and all requisite areas were visited.
Taxonomic uncertainty	No	The flora of the Pilbara region has a number of taxonomic uncertainties. Sharnya Thomson is a Pilbara taxonomic specialist who works daily at the WA Herbarium. Indeterminate taxonomies are checked in consultation with other WA Herbarium specialist botanists who have much experience with Pilbara species or the relevant taxa. All potential DRF and priority species are checked against reference specimens in the herbarium. Taxonomic uncertainty is thus minimised to acceptable levels

Plate 4: Site where vegetation survey was not possible due to recent fire (see Figure 6)

No factors were identified that were considered as being likely to limit the effectiveness of the flora and vegetation survey conducted by Pilbara Flora for Goldsworthy, except for the low rainfall in the 12 months prior to the survey and the recent fires. It is considered that the low rainfall experienced during 2007 may have had an impact floristically on the effectiveness of the survey; however this impact is likely to have been offset by the rainfall that occurred during the 2008 summer season and the massive rainfall in March 2007 (Section 2.4). In general, the vegetation at Goldsworthy during the survey was green, in good condition and showed no visible signs of drought.

A significant area within the southeastern section of the vegetation survey area had been burnt recently (Plate 4). There was insufficient vegetation remaining to conduct a Level 2 vegetation survey in these burnt areas. This burnt area was traversed and vegetation communities were estimated using geological structures and landform similarities with unburnt areas, and by assessing stands of remnant vegetation. It was considered that sufficient information was available to obtain a reasonable estimate of pre-burn vegetation communities.

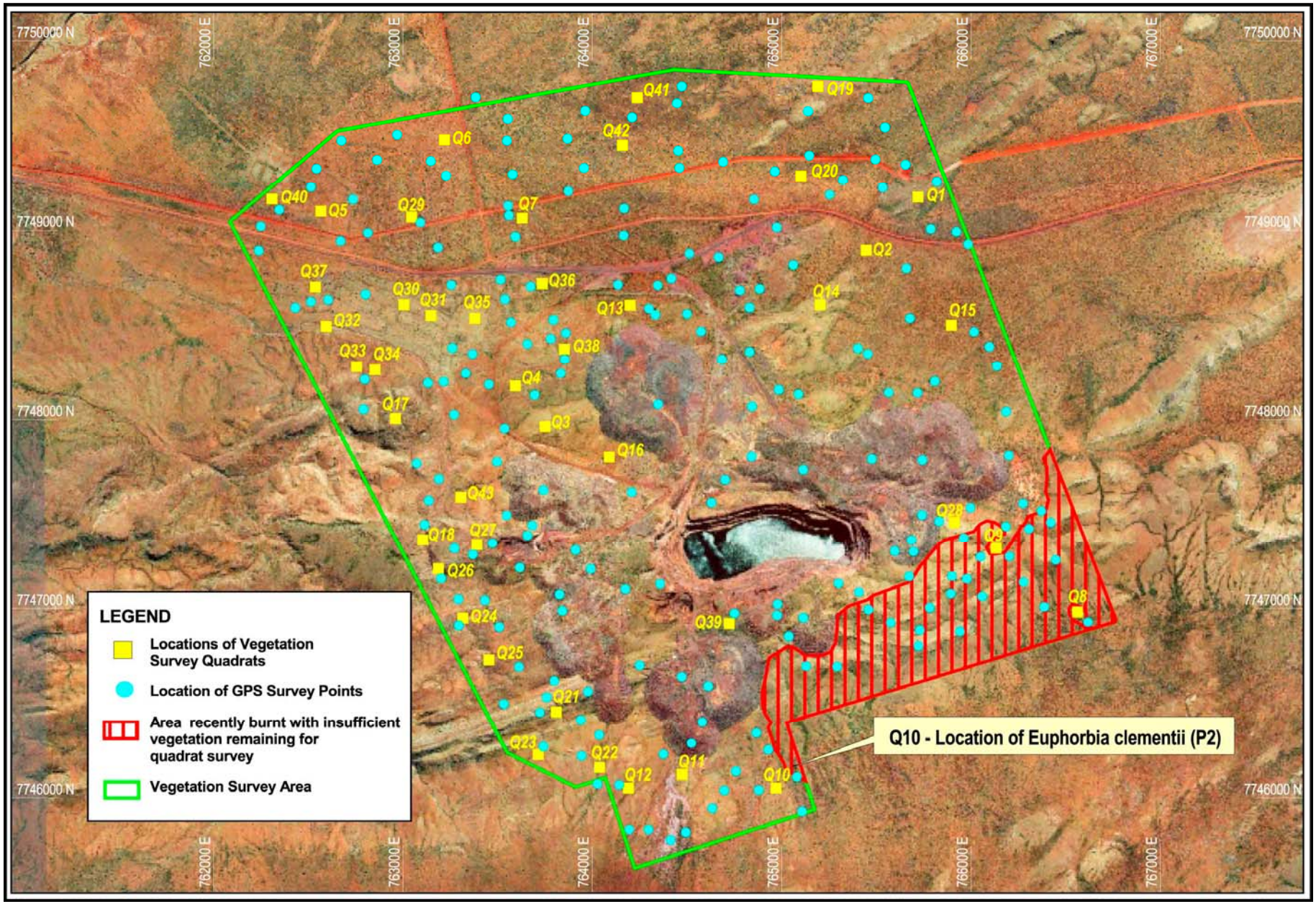

Figure 6: Location of vegetation survey quadrats and GPS survey points

4 Survey Results

4.1 Floristics

A total of 188 vascular taxa from 88 genera and 40 families were recorded from the vegetation survey area (Table 8). Five families dominated in terms of taxa numbers; these being Poaceae, Papilionaceae, Mimosaceae, Malvaceae and Amaranthaceae. Taxa from Tiliaceae, Euphorbiaceae, Myrtaceae, Caesalpiniaceae, Convolvulaceae, Proteaceae and Asteraceae were also dominant but to a lesser extent.

Table 8: Floristic summary of vegetation survey area

Family No.	Family	Genus	Taxa
31	Poaceae	12	26
165	Papilionaceae	10	18
163	Mimosaceae	2	15
221	Malvaceae	4	14
106	Amaranthaceae	4	13
220	Tiliaceae	2	9
185	Euphorbiaceae	4	8
273	Myrtaceae	4	8
164	Caesalpiniaceae	2	8
307	Convolvulaceae	4	7
90	Proteaceae	2	6
345	Asteraceae	3	6
32	Cyperaceae	2	5
315	Solanaceae	2	5
310	Boraginaceae	3	4
341	Goodeniaceae	2	4
137A	Capparaceae	2	3
305	Asclepiadaceae	2	2
105	Chenopodiaceae	2	2
337	Cucurbitaceae	2	2
207	Sapindaceae	2	2
110	Aizoaceae	1	2
316	Stemodia	1	2
110A	Molluginaceae	1	1
281	Apiaceae	1	1
308	Apocynaceae	1	1
317	Bignoniaceae	1	1
113	Caryophyllaceae	1	1
272	Combretaceae	1	1
108	Gyrostemonaceae	1	1
313	Lamiaceae	1	1
131	Lauraceae	1	1
122	Menispermaceae	1	1
87	Moraceae	1	1

Family No.	Family	Genus	Taxa
107	Nyctaginaceae	1	1
331	Rubiaceae	1	1
223	Sterculiaceae	1	1
237	Tamaricaceae	1	1
243	Violaceae	1	1
173	Zygophyllaceae	1	1
Totals	**40**	**88**	**188**

The total taxa count of 188 over this one locality was considered as being lower than expected given the high species diversity within the Pilbara in general (DEWHA 2008b). Surveys over mining sites of comparable size to Goldsworthy in the Central Pilbara have recorded species numbers such as 330 taxa for Tom Price (Pilbara Flora 2008), 367 taxa for Brockman (Biota 2005) and 328 taxa for South Flank Area C (ENV 2008).

However, very few vegetation surveys have been conducted in the Goldsworthy region, which is situated at the very edge of the Pilbara region abutting the expansive sandplains of the Canning Basin. The Goldsworthy area is hence located in a different biogeography when compared to typical Pilbara high biodiversity areas.

Using data from the few available local surveys, a comparable species count was found from vegetation surveys at the Pardoo Direct Iron Site, located approximately 30km to the northeast of Goldsworthy. A total of 238 vascular taxa were recorded from a number of surveys conducted between 2005 and 2007 (Woodman 2007).

A vegetation survey was conducted at the BHPBIO Yarrie Mine, approximately 100km to the east of Goldsworthy, in 1992. A total of 155 vascular taxa were recorded during this survey (Dames and Moore 1992).

ENV recorded 88 plants during vegetation surveys over the Goldsworthy Mine in 2006. These surveys were specifically targeted at mine rehabilitation and not at native vegetation (ENV 2007).

A total of 264 species were recorded from flora surveys of the 440km Telfer gas pipeline corridor (Resource Strategies 2002). The Tefler gas pipeline corridor passes directly through the Goldsworthy tenement ML235SA.

From the limited number of surveys available for the Goldsworthy area, it would appear that the floristic diversity in the Goldsworthy region is significantly less than in other areas of the Pilbara. The total species count of 188 taxa from the Pilbara Flora survey is thus considered as being representative of a typical floristic diversity for the Goldsworthy region.

4.2 Vegetation Types

Nineteen vegetation types and nine mining disturbed landforms were recorded within the Goldsworthy site (Table 9). The four main landforms were Hills, Sandplains, Drainage Lines and Disturbed Ground. A detailed description of each vegetation type is provided in Appendix C, the total species listing by vegetation type is provided in Appendix D and maps of the vegetation types provided in Appendix E.

The vegetation units are all contained within the boundaries of a very large and historical iron ore mine and townsite. There were no vegetation types or landscape units identified

that were considered as being rare, restricted or unique and many areas were considered as having moderate conservation value due to the impact from mining activities.

Table 9: Vegetation Types within the vegetation survey area

No	Description	Area (ha)	Landform	Total (ha)
1	Hillside Spinifex Grassland	10.7	Hills	344.5
2	Hillside Spinifex Open Shrubland	180.2		
3	Hillside Spinifex *Eucalyptus odontocarpa* Woodland	5.6		
4	Hillside Valley Shrubland	7.0		
5	Colluvial Slopes Spinifex Grassland	62.7		
6	Colluvial Slopes Spinifex Shrubland	61.1		
7	Rocky Narrow Valley	3.1		
8	Rocky Hillside *Terminalia canescens* Low Woodland	14.1		
9	Sandplain Spinifex Shrubland Open Woodland	234.4	Sandplain	354.0
10	Sandplain *Corymbia flavescens* Open Woodland	43.4		
11	Sandplain *Acacia stellaticeps* Heath	28.9		
12	Sandplain *Acacia stellaticeps* Heath Open Woodland	13.8		
13	Sandplain *Eucalyptus odontocarpa* Low Woodland	8.6		
14	Sandplain Shrubland with *Eucalyptus odontocarpa*	25.0		
15	Drainage Line Colluvial Hillside	11.0	Drainage Line	25.1
16	Drainage Line Deep Colluvial Creek	2.9		
17	Drainage Line Rocky Hillside	3.4		
18	Drainage Line Medium Creek	3.9		
19	Drainage Line Broad Creek	3.7		
20	Mine Drainage Area	16.1	Disturbed Ground	512.1
21	Regrowth Infrastructure Areas	30.5		
22	Rehabilitation Gas Pipeline	9.3		
23	Rehabilitation Goldsworthy Townsite	51.1		
24	Rehabilitation Infrastructure Areas	107.4		
25	Rehabilitation Waste Dump	195.4		
26	Disturbed Ground No Rehabilitation	11.5		
27	Infrastructure	30.5		
28	Open Pit	60.2		
Total		**1236**		**1236**

4.3 Areas of Native Vegetation and Rehabilitation

Quadrats were used to assess the status of vegetation occurring within rehabilitated areas; these areas being the townsite, waste dumps and former infrastructure areas. Areas under rehabilitation were considered as having vegetation communities that could not be considered as native vegetation. Rehabilitated areas had major dissimilarities to native vegetation in structure, floristic composition and extent of weed occurrence. Hence rehabilitation has not been included as native vegetation in the area calculations (Table 9). Rehabilitation and regrowth vegetation types are described in Appendix C. The areas of native vegetation and disturbed land are provided in Table 10.

Table 10: Areas of native vegetation and disturbed ground at Goldsworthy

Landform	Area (ha)
Native Vegetation	724
Disturbed Ground	512
Total	**1236**

4.4 Condition of Native Vegetation

A total of 724ha within the vegetation survey area was considered as being native vegetation. Native vegetation was generally in good condition but with impacts from the Goldsworthy mining operations. These impacts were commonly old tracks and clearings that had regrown. The condition rating of each vegetation type is provided in Appendix C.

4.5 Conservation Taxa

Under the *Wildlife Conservation Act 1950*, the Minister for the Environment may declare species considered to be in danger of extinction, are rare or otherwise in need of special protection as Declared Rare Flora ('DRF').

No DRF pursuant to Section 23F(2) of the *Wildlife Conservation Act 1950,* as listed by DEC (Atkins 2008), were found within the vegetation survey area at Goldsworthy during the 2008 Pilbara Flora survey.

DEC also lists poorly known and potentially rare species that may be threatened or endangered as Priority Flora (Atkins 2008). There are four categories of Priority Flora, ranging from Priority 1 (taxa with few populations and under immediate threat) to Priority 4 (taxa which are rare but not under any current identifiable threat).

Priority 2 species *Euphorbia clementii* was recorded within the vegetation survey area at:

- Quadrat 10 - 764956mE 7746153mN (GDA 1994 MGA Zone 50).

Priority Two species are defined as:

"Poorly Known - 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" (Florabase 2008).

Quadrat 10, where *Euphorbia clementii* was recorded, is located on undisturbed gravelly sand plains approximately 400m south of the southern most waste dump (known as Billy Goat Dump) within G45/278 (Figure 6). This location is well outside of the Goldsworthy mine footprint. The number of individuals of *Euphorbia clementii* was not recorded but it was assigned a cover index of less than 1%.

Florabase has four records of *Euphorbia clementii* which it lists as occurring on red sands with gravel or on stony ground below hillsides (Florabase 2008). *Euphorbia clementii* has been recorded in the lower central Pilbara south of Mt Robinson (Florabase 2008), the northeast Pilbara near the De Grey crossing (Florabase 2008), the East Pilbara at Talga Gap (Florabase 2008), the central Pilbara near Wodgina (Hope Downs Management Services 2002) and at Yarrie and Nimingarra (BHPBIO 2006). This species was recorded by Pilbara Flora at Goldsworthy at the junction of colluvial scree slopes from nearby hillsides and the start of the sandplain. The soil was a mixture of red sands and scree gravel.

Quadrat 10 was the only location at Goldsworthy where this sand and gravel mixed soil type was recorded.

Euphorbia clementii was recorded in two locations at Yarrie and two locations at Nimigarra during flora surveys undertaken for BHPBIO for the Goldsworthy Extension Project (BHPBIO 2006). BHPBIO has produced a 'Significant Species Management Plan' for the Goldsworthy Extension Project that includes various measures for the protection of conservation taxa in general and a species specific management plan for *Euphorbia clementii* (BHPBIO 2006).

Although this species is a Priority 2, it has been recorded in the Northeast Pilbara from a rectangular area approximately 100 by 120km (Wodgina to Marble Bar to Yarrie to De Grey River). This species is not a short range endemic. The conservation status of *Euphorbia clementii* should therefore not be significantly impacted by the proposed activities at the Goldsworthy.

4.6 Introduced Species

Five introduced species were recorded within the vegetation survey area, these being:

- *Aerva javanica* – Kapok
- *Calotropis procera* - Calotropis
- *Cenchrus ciliaris* – Buffel Grass
- *Tamarix aphylla* - Athel Pine
- *Vachellia farnesiana* – Mimosa Bush.

The location of all introduced species is provided in Appendix F and displayed in Figure 7. Generally, weed species were confined to disturbed areas with very little encroachment into undisturbed native vegetation. In particular, Buffel Grass (*Cenchrus ciliaris*) infestations were significant within the Goldsworthy townsite and areas of rehabilitated infrastructure. In some areas within the Goldsworthy townsite, monoculture patches of Buffel Grass grassland had formed with between 80 to 100% 'blanket' foliage cover (Plate 5). In areas of high Buffel Grass infestation, the ecological value of the rehabilitated land is low, although conversely, the pastoral value is elevated.

Plate 5: Buffel Grass (*Cenchrus ciliaris*) infestation in the old Goldsworthy townsite

Two of the introduced species recorded at Goldsworthy, *Tamarix aphylla* and *Calotropis procera,* are Declared Plants under the *Agriculture and Related Resources Protection Act 1976* (APB 2007). The Department of Agriculture and Food (DAFWA) maintains a database of all Declared Plants and their control requirements (DAFWA 2008). Weed species are declared for specific districts and the control requirements also vary according to district. The areas of declaration and the control requirements for *Tamarix aphylla* and *Calotropis procera* are provided in Table 11.

Table 11: Information of Declared Plants and control obligations (DAFWA 2008)

Control Codes and Landholder Obligations	Declared Plant	Declaration Area
P1 Requirements – Aim is to prohibit movement The movement of plants or their seeds is prohibited within the State. The movement of contaminated machinery and produce including livestock and fodder is prohibited within the State.	*Tamarix aphylla*	Entire State
	Calotropis procera	Municipal districts of Esperance, Port Hedland and Roebourne
P2 Requirements - Aim is to eradicate infestation Treat all plants to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.	*Calotropis procera*	Municipal districts of East Pilbara, Port Hedland and Roebourne

Both *Tamarix aphylla* and *Calotropis procera* are Declared Plants in the Goldsworthy locality.

As a Category P1 Declared Plant, *Tamarix aphylla* must be restricted to site and kept from spreading to other areas.

Calotropis procera is both a Category P1 and P2 Declared Plant. BHPBIO is thus required to restrict the movement and spread of *Calotropis procera* and also to eradicate this species from the Goldsworthy site. One *Calotropis procera* plant was located on the waste dump at 764827mE 7747908mN (Plate 6). Several *Tamarix aphylla* were located near the northern edge of the townsite at 762505mE 7748617mN. Both of these declared species were showing no signs of invasive propagation.

Given the low numbers of *Tamarix aphylla* and *Calotropis procera* observed at Goldsworthy and the observation that these species were occurring as individual plants and not as large invasive populations, these Declared Plants are not considered as representing a high environmental risk at present. BHPBIO has developed weed management protocols under the Environmental Management Plan for the Goldsworthy Extension Project (BHPBIO 2007). DAFWA has a handbook for the control of Declared Plants (Department of Agriculture 2002).

Plate 6: Declared weed *Calotropis procera* at Goldsworthy

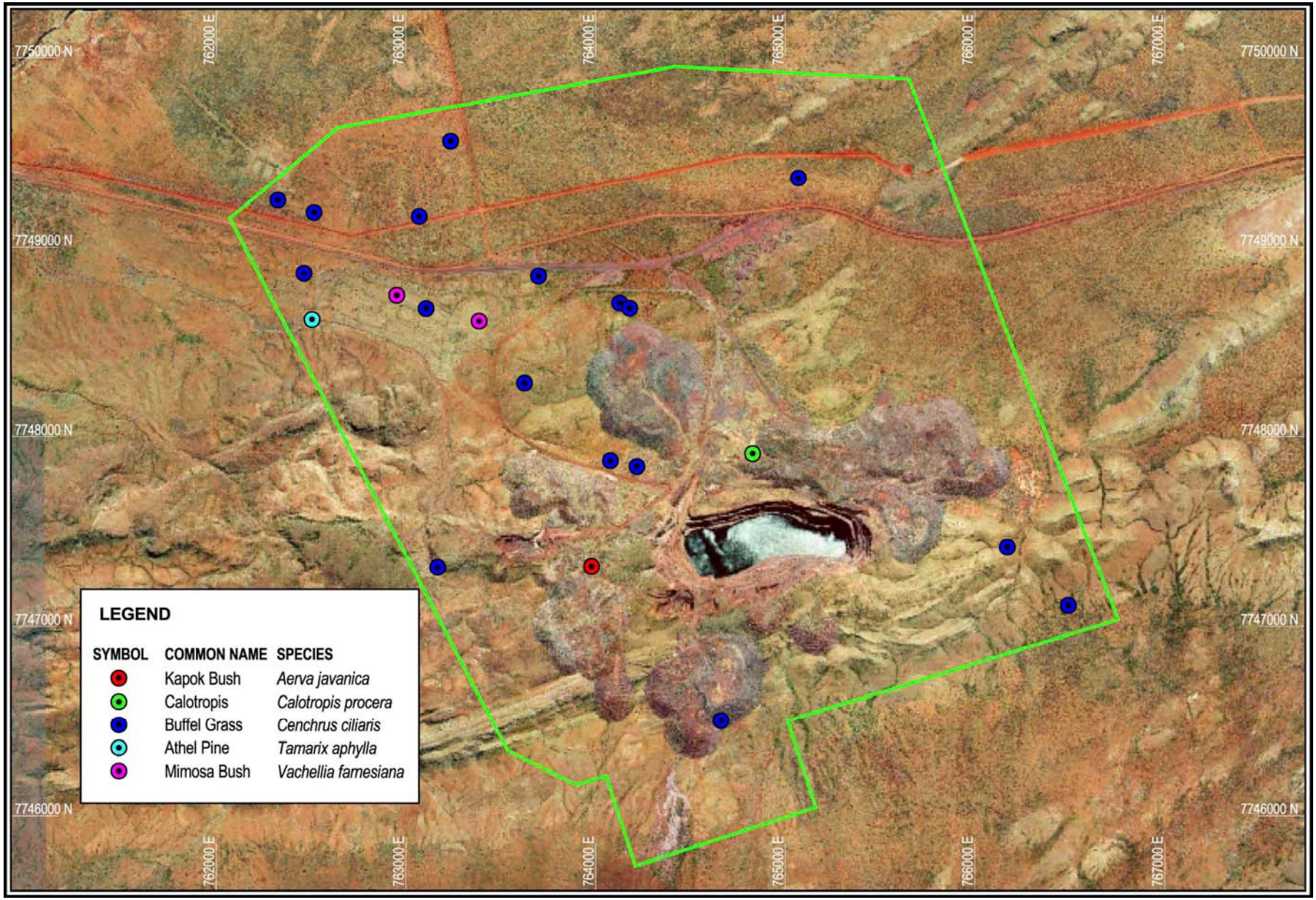

Figure 7: Location of introduced species at Goldsworthy

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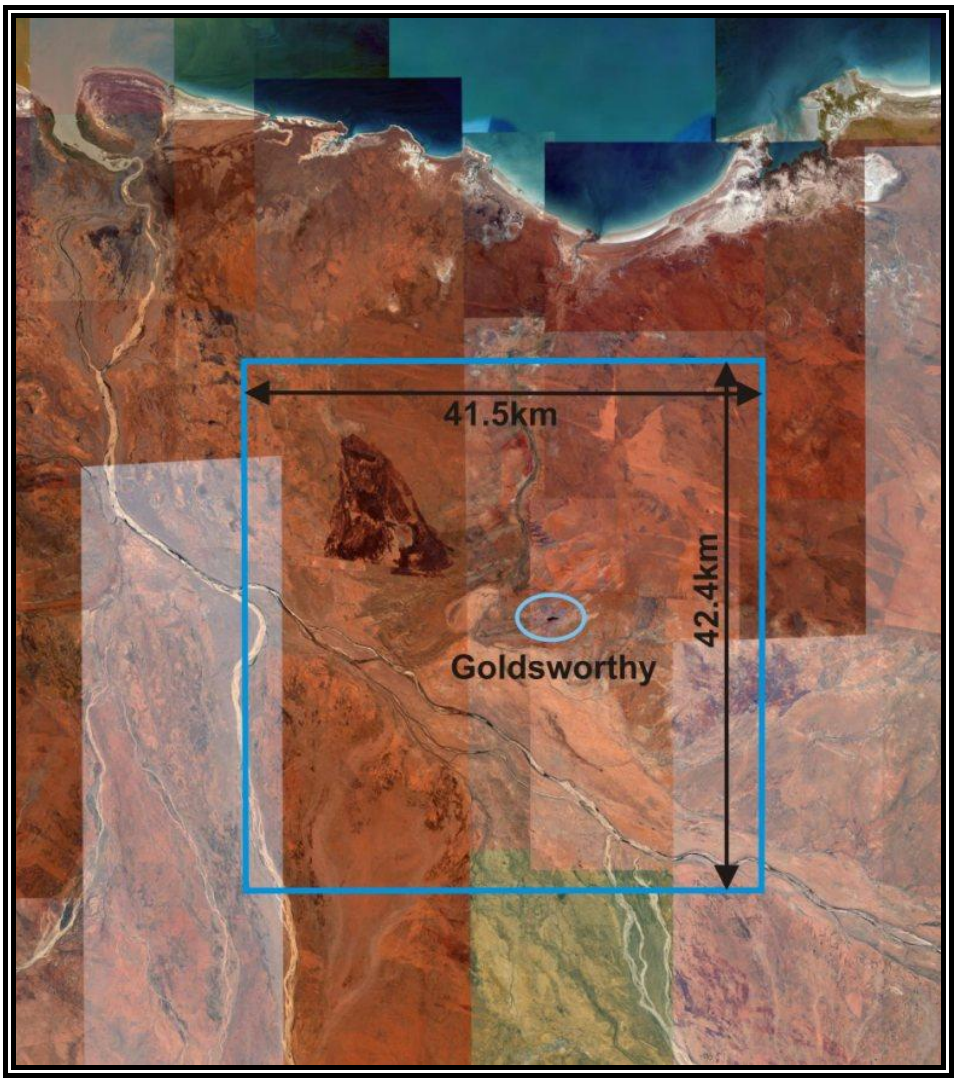
Appendices

Appendix A

Department of Conservation and Environment
Request for Rare Flora Information
04 June 2008



DEC search area

Department of Environment and Conservation

Your reference:
Our reference: 2008/001163-1
Enquiries: Bridgitte Long

Phone: 9334 0123
Fax: 9334 0278
Email: bridgitte.long@dec.wa.gov.au

Pilbara Flora
10 Vista Drive
Parkerville WA 6081

Attention: Charles Newland

Dear Mr Newland

REQUEST FOR RARE FLORA INFORMATION

I refer to your request of 4th June 2008 for information on rare flora in the Goldsworthy area. The search co-ordinates used were 20^0 10' - 20^0 33' S and 119^0 18' - 119^0 42' E (GDA 94).

A search was undertaken for this area of **(1)** the Department's *Threatened (Declared Rare) Flora* database (for results, *if any*, see "Threatened Flora Data" – coordinates are GDA 94), **(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 GDA 94 – 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 "Declared Rare and Priority Flora 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 $200 (plus GST) to supply this information will be forwarded.

It would be appreciated if any populations of rare flora encountered by you 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

B A Long

.....

for Keiran McNamara
DIRECTOR GENERAL
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

4th June, 2008

Please note: Co-ordinates supplied for all data search requests must be provided in latitude/longitude format, 'eastings and northings' are no longer suitable. Thank you.

SPECIES & COMMUNITIES BRANCH 17 Dick Perry Ave, Technology Park, Kensington
Postal Address: Locked Bag 104, Bentley Delivery Centre, Bentley, Western Australia 6983
Phone: (08) 9334 0455 Fax: (08) 9334 0278 Website: www.naturebase.net

4/06/2008 **DEPARTMENT OF ENVIRONMENT AND CONSERVATION** Page 1
DECLARED RARE AND PRIORITY FLORA LIST
26 February 2008

SPECIES / TAXON	CONS CODE	CALM REGION	DISTRIBUTION	FLOWER PERIOD
Acacia glaucocaesia	3	P	Karratha, Port Hedland, Mardie, Roebourne, De Grey	Jul-Sep
Mimulus clementii	1	P	Between Ashburton and De Grey Rivers	
Phyllanthus aridus	3	K,P	West Kimberley, Chichester Range, West Angelas, Pardoo, Shay Gap, Doongan Homestead, Durack River	-

September 30, 2008

WAHERB SPECIMEN DATABASE
GENERAL ENQUIRY

Abutilon trudgenii
R.M.Barker ms (Malvaceae)
CONSERVATION STATUS:P3
Coll.: N. Casson AA 0070 Date: 14 07 1994 (PERTH 3977765)
LOCALITY Goldsworthy near T10 (Rehabilitation Area only) WA
LAT 20 Deg 20 Min Sec S LONG 119 Deg 30 Min Sec E
Herb 60 cm high, leaves mid green.
Previous det.: Abutilon lepidum aff. (F.Muell.)A.S.Mitch.

Acacia glaucocaesia
Domin (Mimosaceae)
CONSERVATION STATUS:P3
Coll.: L. Thomson LXT 1183 Date: 30 10 1988 (PERTH 01012088)
LOCALITY Goldsworthy turn-off on North West Coastal Highway WA
LAT 20 Deg 19 Min Sec S LONG 119 Deg 25 Min Sec E
Large, multistemmed spreading shrubs/small trees. Most trees have glaucous/bluish phyllodes, but some plants have bright green phyllodes (<1% of population green). Non-spiny and favoured browse of cattle.
Growing in low-lying indistinct drainage on plain. Red sandy loam (pH 7.5). Near monospecific stand of this species.
Previous det.: Acacia glaucocaesia Domin

Acacia glaucocaesia
Domin (Mimosaceae)
CONSERVATION STATUS:P3
Coll.: G. Cassis PILB 179 Date: 24 08 2005 (PERTH 07300670)
LOCALITY 13 km E of Streely Creek Bridge between Port Hedland and Pardoo WA
LAT 20 Deg 18 Min 22.400 Sec S LONG 119 Deg 19 Min 34.000 Sec E
Host No. 37.
Previous det.: Acacia synchronicia Maslin

Acacia glaucocaesia
Domin (Mimosaceae)
CONSERVATION STATUS:P3
Coll.: B.R. Maslin 8419 Date: 06 07 2003 (PERTH 06492207)
LOCALITY 8 km E of De Grey River Crossing on North West Coastal Highway towards Broome WA
LAT 20 Deg 18 Min 17.100 Sec S LONG 119 Deg 19 Min 24.800 Sec E
Erect tree 6-7 m tall (most plants 2-4 m tall here). With 1 or 2 sub-straight
main stems from ground level, stems much-branched from low down. Crowns
typically dense than those of A. synchronicia. Spiny stipules mostly absent. Hard red-brown clay on flat plain.
With Lysophyllum cunninghamii.
Frequency:common along roadverge locally.

Acacia glaucocaesia
Domin (Mimosaceae)
CONSERVATION STATUS:P3
Coll.: B.R. Maslin 8418 Date: 06 07 2003 (PERTH 06492363)
LOCALITY 8 km E of De Grey River crossing on North West Coastal Highway towards Broome WA
LAT 20 Deg 18 Min 17.100 Sec S LONG 119 Deg 19 Min 24.800 Sec E
Erect shrub with ascending branches and rather dense crown. Bark grey at base of
main stems, light green on branches. Spiny stipules (slender) present or more commonly absent.
Hard red brown clay on flat plain. With Lysiphyllum cunninghamii.
A large population of A. glaucocaesia here, this nor-pruinose form is quite common (compare with BRM 8419)
Frequency:common along road verge locally.

Bulbostylis burbidgeae
K.L.Wilson (Cyperaceae)
CONSERVATION STATUS:P3
Coll.: R.P. Hart 2092 Date: 20 08 1995 (PERTH 04275098)
LOCALITY Remote granite rock 100 km east of Port Hedland. WA
LAT 20 Deg 21 Min 25.000 Sec S LONG 119 Deg 39 Min 13.000 Sec E
In a soil pocket on a granite rock. With other ephemeral herbs and grasses.

Page 1 of 1

June 4, 2008 Summary of Threatened Flora Data Page 1 of 1

Total No. of Records = 2

Species Name	Cons. Code	Status	Pop ID	No. Plants	Latitude	Longitude	Purpose	Vest
Acacia glaucocaesia	3		1		20^19'05.8"	119^26'28.3"	Road Verge	MRD
			7		20^18'22.4"	119^19'34.0"	Road Verge	MRD

Appendix B

Trudgen's Vegetation Condition Rating System and Vegetation Structural Classification System

Vegetation Condition Rating System

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

Vegetation Structural Classification System

Life form and height of tallest stratum	Projective foliage cover of tallest stratum as %	Description
Trees over 30m	70 - 100	High closed forest
	30 - 70	High open forest
	10 - 30	High woodland
	2 - 10	High open woodland
	under 2	Scattered tall trees
Trees 10 - 30m	70 - 100	Closed forest
	30 - 70	Open forest
	10 - 30	Woodland
	2 - 10	Open woodland
	under 2	Scattered trees
Trees under 10m	70 - 100	Low closed forest
	30 - 70	Low open forest
	10 - 30	Low woodland
	2 - 10	Low open woodland
	under 2	Scattered low trees
Shrubs over 2m	70 - 100	Closed scrub
	30 - 70	Open scrub
	10 - 30	High shrubland
	2 - 10	High open shrubland
	under 2	Scattered tall shrubs
Shrubs 1 - 2m	70 - 100	Closed heath
	30 - 70	Open heath
	10 - 30	Shrubland
	2 - 10	Open shrubland
	under 2	Scattered shrubs
Shrubs under 1m	70 - 100	Low closed heath
	30 - 70	Low open heath
	10 - 30	Low shrubland
	2 - 10	Low open shrubland
	under 2	Low scattered shrubs
Herbs/Sedges/Grasses	70 - 100	Closed herb, sedge, grassland
	30 - 70	Herb, sedge, grassland
	10 - 30	Open herb, sedge, grassland
	2 - 10	Very open herb, sedge, grassland
	under 2	Scattered herbs sedges, grasses

Grasslands are divided into:

- Tussock grasslands (perennial tussock species, e.g. *Eragrostis* species);
- Hummock grasslands (*Triodia* species that form hummocks)
- Curly spinifex grassland (*Triodia pungens* which does not form hummocks)
- Annual tussock grassland (e.g. annual *Sorghum* species).
- The "curly spinifex grassland" division follows J.S. Beard (1990).

The table is based on the original vegetative descriptions published by Ray Specht as modified by Ted Alpin with further modifications by Malcolm Trudgen (unpublished).

Appendix C

Description of vegetation and disturbed landform types occurring within the vegetation survey area

The compete species lists for each vegetation type is provided in Appendix D

Vegetation maps are provided as Appendix E

Reference Table for Vegetation and Disturbed Landforms

No.	Vegetation / Disturbed Landform Types	Landform	Area
1	Hillside Spinifex Grassland	Hills	10.7
2	Hillside Spinifex Open Shrubland	Hills	180.2
3	Hillside Spinifex *Eucalyptus odontocarpa* Woodland	Hills	5.6
4	Hillside Valley Shrubland	Hills	7.0
5	Colluvial Slopes Spinifex Grassland	Hills	62.7
6	Colluvial Slopes Spinifex Shrubland	Hills	61.1
7	Rocky Narrow Valley	Hills	3.1
8	Rocky Hillside *Terminalia canescens* Low Woodland	Hills	14.1
9	Sandplain Spinifex Shrubland Open Woodland	Sandplain	234.4
10	Sandplain *Corymbia flavescens* Open Woodland	Sandplain	43.4
11	Sandplain *Acacia stellaticeps* Heath	Sandplain	28.9
12	Sandplain *Acacia stellaticeps* Heath Open Woodland	Sandplain	13.8
13	Sandplain *Eucalyptus odontocarpa* Low Woodland	Sandplain	8.6
14	Sandplain Shrubland with *Eucalyptus odontocarpa*	Sandplain	25.0
15	Drainage Line Colluvial Hillside	Drainage Line	11.0
16	Drainage Line Deep Colluvial Creek	Drainage Line	2.9
17	Drainage Line Rocky Hillside	Drainage Line	3.4
18	Drainage Line Medium Creek	Drainage Line	3.9
19	Drainage Line Broad Creek	Drainage Line	3.7
20	Mine Drainage Area	Disturbed Ground	16.1
21	Regrowth Infrastructure Areas	Disturbed Ground	30.5
22	Rehabilitation Gas Pipeline	Disturbed Ground	9.3
23	Rehabilitation Goldsworthy Townsite	Disturbed Ground	51.1
24	Rehabilitation Infrastructure Areas	Disturbed Ground	107.4
25	Rehabilitation Waste Dump	Disturbed Ground	195.4
26	Disturbed Ground No Rehabilitation	Disturbed Ground	11.5
27	Infrastructure	Disturbed Ground	30.5
28	Open Pit	Disturbed Ground	60.2
Total			**1236**

Landform Type 1	Hillside Spinifex Grassland		
Vegetation:	Native vegetation	**Area (ha):**	10.7
Landscape:	Rolling hillsides		
Soil:	Colluvial pebble scree with sandy silt fines		
Vegetation Structural Classification:	Scattered shrubs over *Acacia adoxa* var *adoxa* low open shrubland over *Triodia pungens* hummock grassland.		
Burn Age:	> 3 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Triodia pungens* and *Acacia adoxa* var *adoxa*		
Sub-dominant or locally dominant species:	*Acacia ancistrocarpa, Acacia inaequilatera, Acacia monticola, Bonamia media* var. *villosa, Corchorus parviflorus, Grevillea wickhamii* subsp *macrodonta, Senna glutinosa* subsp g*lutinosa and Tephrosia rosea* var. *clementii*		
Weeds:	No weeds recorded		
Condition Rating:	Good condition, some old overgrown tracks		

Hillside Spinifex Grassland – typical vegetation

Hillside Spinifex Grassland - soil surface

Landform Type 2	Hillside Spinifex Open Shrubland		
Vegetation:	Native vegetation	**Area (ha):**	180.2
Landscape:	Quartz rocky low hill		
Soil:	Rocky outcropping, boulder and pebble scree		
Vegetation Structural Classification:	*Corymbia hamersleyana* scattered low trees over *Grevillea wickhamii* subsp *macrodonta* and *Acacia inaequilatera* high shrubland over *Corchorus parviflorus, Acacia adoxa* var *adoxa* and *Goodenia candicans* low open shrubland over *Triodia pungens* hummock grassland.		
Burn Age:	>3 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia adoxa* var *adoxa, Acacia inaequilatera, Corchorus parviflorus, Corymbia hamersleyana, Dampiera candicans, Grevillea wickhamii* subsp *macrodonta, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia ancistrocarpa, Acacia acradenia, Acacia monticola, Bonamia media* var *villosa, Eriachne pulchella* subsp *dominii, Hakea macrocarpa, Petalostylis labicheoides, Tephrosia rosea* var *clementii, Triumfetta maconochieana*		
Weeds:	None recorded		
Condition Rating:	Very good		

Hillside Spinifex Open Shrubland – typical vegetation

Hillside Spinifex Open Shrubland – soil surface

Landform Type 3	Hillside Spinifex Eucalyptus odontocarpa Woodland		
Vegetation:	Native vegetation	**Area (ha):**	5.6
Landscape:	Rolling hillsides		
Soil:	Colluvial pebble scree with sandy silt fines		
Vegetation Structural Classification:	*Eucalyptus odontocarpa* low open woodland over *Acacia inaequilatera, Grevillea wickhamii* subsp *macrodonta* and *Acacia monticola* scattered shrubs over *Acacia adoxa* var *adoxa, Senna glutinosa* subsp *glutinosa, Tephrosia rosea* var *clementii* and *Corchorus parviflorus* low scattered shrubs over *Triodia pungens* hummock grassland.		
Burn Age:	> 3 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia adoxa* var *adoxa, Acacia inaequilatera, Acacia monticola, Corchorus parviflorus, Eucalyptus odontocarpa, Grevillea wickhamii* subsp *macrodonta, Senna glutinosa* subsp *glutinosa, Tephrosia rosea* var *clementii, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia ancistrocarpa, Acacia acradenia, Corymbia hamersleyana, Cymbopogon obtectus, Cynanchum floribundum, Ptilotus calostachyus* var *calostachyus, Triumfetta maconochieana.*		
Weeds:	None recorded		
Condition Rating:	Good		

Hillside Spinifex *Eucalyptus odontocarpa* Woodland – typical vegetation

Hillside Spinifex *Eucalyptus odontocarpa* Woodland – soil surface

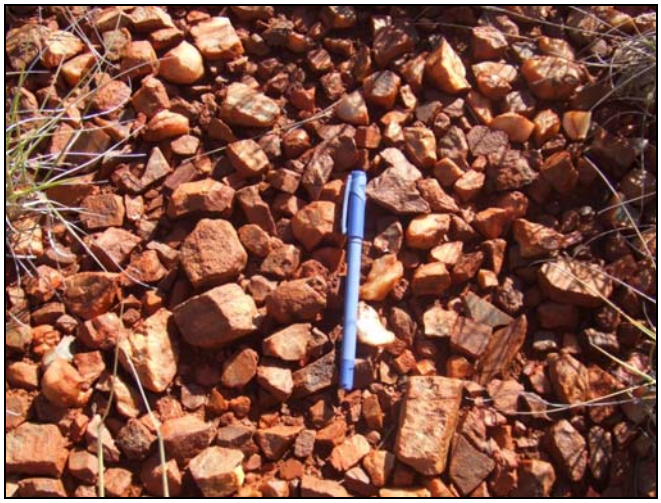
Landform Type 4	Hillside Valley Shrubland		
Vegetation:	Native vegetation	**Area (ha):**	7.0
Landscape:	Valleys in hill system in southern portion of vegetation survey area		
Soil:	Rock outcropping, large pebble scree, some red soil fines		
Vegetation Structural Classification:	*Terminalia canescens* and *Corymbia hamersleyana* low open woodland over *Acacia monticola, Acacia acradenia and Grevillea wickhamii* subsp *macrodonta* high open Shrubland over *Triodia pungens* hummock grassland.		
Burn Age:	Much of area burnt very recently, remaining patches where available were surveyed		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia monticola, Acacia acradenia , Corymbia hamersleyana, Grevillea wickhamii* subsp *macrodonta, Terminalia canescens, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia adoxa* var *adoxa, Atalaya hemiglauca, Corchorus parviflorus, Corymbia ?opaca, Crotalaria novae-hollandiae* subsp *novae-hollandiae, Eriachne mucronata, Eucalyptus odontocarpa, Gossypium australe, Hibiscus leptocladus, Indigofera monophylla, Polymeria ambigua, Rhynchosia minima, Tephrosia rosea* var *clementii.*		
Weeds:	No weed species recorded.		
Condition Rating:	Very good, except approximately 95% recently burnt		

Hillside Valley Shrubland – typical vegetation

Hillside Valley Shrubland – soil surface

Landform Type 5	Colluvial Slopes Spinifex Grassland		
Vegetation:	Native vegetation	**Area (ha):**	62.7
Landscape:	Low slightly undulating colluvial areas at base of hills		
Soil:	Pebble scree		
Vegetation Structural Classification:	*Acacia inaequilatera, Acacia acradenia* and *Grevillea wickhamii* subsp *macrodonta* scattered tall shrubs over *Triodia pungens or Triodia wiseana* hummock grassland.		
Burn Age:	>3 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia inaequilatera, Acacia acradenia, Grevillea wickhamii* subsp *macrodonta, Triodia pungens, Triodia wiseana*		
Sub-dominant or locally dominant species:	*Corchorus parviflorus, Corchorus* sp, *Petalostylis labicheoides, Ptilotus calostachyus* var *calostachyus, Solanum dioicum*		
Weeds:	No weeds recorded		
Condition Rating:	Very good condition		

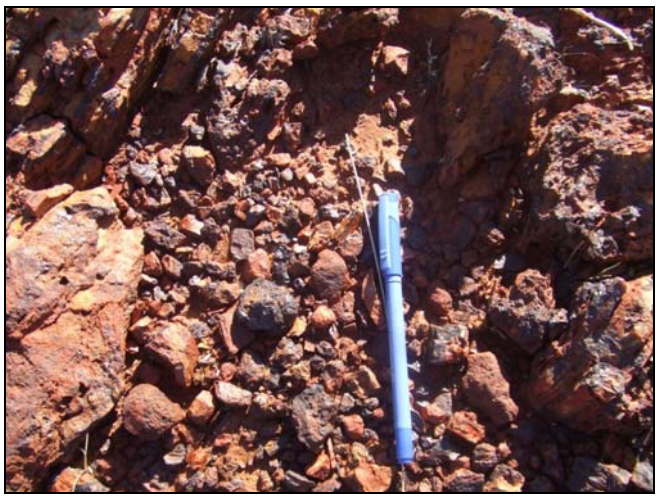
Colluvial Slopes Spinifex Grassland – typical vegetation



Colluvial Slopes Spinifex Grassland – soil surface

Landform Type 6	Colluvial Slopes Spinifex Shrubland		
Vegetation:	Native vegetation	**Area (ha):**	61.1
Landscape:	Low rolling colluvial hillsides.		
Soil:	Ferrugineous outcropping with ironstone pebble scree		
Vegetation Structural Classification:	*Corymbia hamersleyana* scattered low trees over *Acacia adoxa* var *adoxa, Acacia acradenia, Acacia monticola* and *Grevillea wickhamii* subsp *macrodonta* high open shrubland over *Jacksonia aculeata, Tephrosia monophylla* and *Triumfetta chaetocarpa* low scattered shrub over *Triodia pungens* open hummock grassland.		
Burn Age:	> 3 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia adoxa* var *adoxa, Acacia acradenia, Acacia monticola, Corymbia hamersleyana, Grevillea wickhamii* subsp *macrodonta, Jacksonia aculeata, Tephrosia rosea* var *clementii, Triodia pungens, Triumfetta chaetocarpa*		
Sub-dominant or locally dominant species:	*Eriachne pulchella* subsp *dominii, Dampiera candicans, Goodenia stobbsiana, Petalostylis labicheoides, Ptilotus calostachyus* var *calostachyus, Sida cardiophylla, Tephrosia rosea* var *clementii monophylla.*		
Weeds:	No weeds recorded.		
Condition Rating:	Very good		

Colluvial Slopes Spinifex Shrubland – typical vegetation



Colluvial Slopes Spinifex Shrubland - soil surface

Landform Type 7	Rocky Narrow Valley		
Vegetation:	Native vegetation	**Area (ha):**	**3.1**
Landscape:	Narrow rocky steep sided valley approximately 40m wide and 8m deep.		
Soil:	Rocky boulder creek bed and rocky valley walls, minimal soil.		
Vegetation Structural Classification:	*Terminalia canescens* and *Atalaya hemiglauca* low woodland over *Acacia tumida* var *pilbarensis* scattered tall shrubs over *Cymbopogon ambiguous and Eriachne mucronata* very open tussock grassland / *Triodia pungens* open hummock grassland.		
Burn Age:	> 3 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia tumida* var *pilbarensis, Atalaya hemiglauca, Cymbopogon ambiguous, Eriachne mucronata, Terminalia canescens, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia acradenia, Amaranthus mitchellii, Corchorus parviflorus, Corymbia hamersleyana, Grevillea wickhamii* subsp *macrodonta, Indigofera monophylla, Petalostylis labicheoides.*		
Weeds:	**Cenchrus ciliaris* in patches.		
Condition Rating:	Very good.		

Rocky Narrow Valley – typical vegetation

Rocky Narrow Valley- soil surface

Landform Type 8	Rocky Hillside *Terminalia canescens* Low Woodland		
Vegetation:	Native vegetation	**Area (ha):**	14.1
Landscape:	Rocky quartzite chert hillsides		
Soil:	Rock outcropping, minimal soil.		
Vegetation Structural Classification:	*Terminalia canescens* and *Atalaya hemiglauca* low woodland over *Cyperus cunninghamii* and *Acacia monticola* open shrubland over *Acacia adoxa* var *adoxa* low open shrubland over *Cymbopogon ambiguus, Enneapogon robustissimus* and *Eriachne mucronata* open tussock grassland / *Triodia pungens* hummock grassland.		
Burn Age:	> 3 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia adoxa* var *adoxa, Acacia monticola, Atalaya hemiglauca, Cymbopogon ambiguus, Cyperus cunninghamii, Enneapogon robustissimus, Eriachne mucronata, Terminalia canescens, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia colei* var *colei, Carissa lanceolata, Corchorus parviflorus, Crotalaria medicaginea* subsp *neglecta, Eucalyptus odontocarpa, Gossypium australe, Hybanthus aurantiacus, Senna glutinosa* subsp *glutinosa, Tephrosia monophylla.*		
Weeds:	No weeds recorded.		
Condition Rating:	Excellent		

Rocky Hillside *Terminalia canescens* Low Woodland – typical vegetation

Rocky Hillside *Terminalia canescens* Low Woodland – soil surface

Landform Type 9	Sandplain Spinifex Shrubland Open Woodland		
Vegetation:	Native vegetation	**Area (ha):**	234.4
Landscape:	Low relief sandplain		
Soil:	Red pindan sand		
Vegetation Structural Classification:	*Corymbia hamersleyana, Corymbia zygophylla* and *Dolichandrone heterophylla* low open woodland over *Acacia ancistrocarpa* and *Acacia tumida* var *pilbarensis* closed scrub over *Acacia stellaticeps, Corchorus elachocarpus, Bonamia pannosa, Jacksonia aculeata, Ptilotus astrolasius* var *astrolasius* and *Tephrosia rosea* var *glabrior* ms low shrubland over *Triodia schinzii* hummock grassland / **Cenchrus ciliaris, Aristida holathera* var *holathera* and *Eragrostis eriopoda* open tussock grassland.		
Burn Age:	Mixed burn history, recent to > 5 years.		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Triodia schinzii, *Cenchrus ciliaris, Acacia ancistrocarpa, Acacia stellaticeps, Acacia tumida* var *pilbarensis, Aristida holathera* var *holathera, Bonamia pannosa, Corchorus elachocarpus, Corymbia hamersleyana, Corymbia zygophylla, Dolichandrone heterophylla, Eragrostis eriopoda, Jacksonia aculeata, Ptilotus astrolasius* var *astrolasius, Tephrosia rosea* var *glabrior* ms, *Trianthema pilosa*		
Sub-dominant or locally dominant species:	*Acacia acradenia, Corchorus* sp, *Crotalaria ramosissima, Goodenia microptera, Heliotropium vestitum, Hibiscus leptocladus, Hybanthus aurantiacus, Mollugo molluginea, Polymeria ambigua, Ptilotus arthrolasius, Ptilotus calostachyus* var *calostachyus, Senna notabilis, Tephrosia rosea* var *clementii, Tribulus hirsutus, Triodia pungens.*		
Weeds:	**Cenchrus ciliaris* common is disturbed areas, often as a monoculture.		
Condition Rating:	Good to very poor as the vegetation type has extensive areas with infrastructure corridors or weed infested rehabilitation areas.		

Sandplain Spinifex Shrubland Open Woodland – typical vegetation (unburnt / burnt)

Sandplain Spinifex Shrubland Open Woodland – soil surface

Landform Type 10	Sandplain *Corymbia flavescens* Open Woodland		
Vegetation:	Native vegetation	**Area (ha):**	43.4
Landscape:	Low relief sandplain		
Soil:	Red pindan sand		
Vegetation Structural Classification:	*Corymbia flavescens* and *Corymbia hamersleyana* open woodland over *Acacia ancistrocarpa, Acacia acradenia* and *Acacia tumida* var *pilbarensis* high shrubland over *Triodia pungens* and *Triodia schinzii* closed hummock grassland.		
Burn Age:	Mixed burn history, some areas > 5 years, others between 0.5 and 2 years since burn.		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia ancistrocarpa, Acacia acradenia, Acacia tumida* var *pilbarensis, *Cenchrus ciliaris, Corymbia flavescens, Corymbia hamersleyana, Triodia pungens, Triodia schinzii*		
Sub-dominant or locally dominant species:	*Acacia stellaticeps, Bonamia pannosa, Corchorus elachocarpus, Eragrostis eriopoda, Eucalyptus camaldulensis* var *obtusa, Hakea lorea* subsp l*orea, Jacksonia aculeata, Petalostylis labicheoides, Tephrosia rosea* var *glabrior* ms.		
Weeds:	**Cenchrus ciliaris* in patches.		
Condition Rating:	Good to poor as the vegetation type has extensive areas with infrastructure corridors or weed infested rehabilitation areas.		

Sandplain *Corymbia flavescens* Open Woodland

Sandplain *Corymbia flavescens* Open Woodland – soil surface

Landform Type 11	Sandplain *Acacia stellaticeps* Heath		
Vegetation:	Native vegetation	**Area (ha):**	28.9
Landscape:	Low relief sandplain		
Soil:	Red pindan sand		
Vegetation Structural Classification:	*Corymbia hamersleyana* low open woodland over *Acacia stellaticeps* closed heath over *Triodia schinzii* hummock grassland.		
Burn Age:	Mixed burn history, some areas > 5 years, others between 0.5 and 2 years since burn.		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia stellaticeps, Corymbia hamersleyana, Pterocaulon sphaeranthoides, Triodia schinzii*		
Sub-dominant or locally dominant species:	*Triodia pungens, Acacia ancistrocarpa, Acacia tumida* var *pilbarensis, Corchorus elachocarpus, Cyperus blakeanus, Eragrostis eriopoda, Goodenia candicans, Grevillea wickhamii* subsp *macrodonta, Hakea macrocarpa, Hibiscus leptocladus, Pluchea tetranthera*		
Weeds:	No weeds recorded.		
Condition Rating:	Very good.		

Sandplain *Acacia stellaticeps* Heath – typical vegetation

Sandplain *Acacia stellaticeps* Heath – soil surface

Landform Type 12	Sandplain *Acacia stellaticeps* Heath Open Woodland		
Vegetation:	Native vegetation	**Area (ha):**	13.8
Landscape:	Low relief sandplain		
Soil:	Red pindan sand		
Vegetation Structural Classification:	*Corymbia zygophylla* low open woodland over *Acacia ancistrocarpa* and *Acacia tumida* var *pilbarensis* high open shrubland over *Acacia stellaticeps* and T*ephrosia rosea* var *glabrior* ms shrubland over *Eragrostis eriopoda* and *Triodia schinzii* open hummock grassland.		
Burn Age:	Very recent		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia ancistrocarpa, Acacia stellaticeps, Acacia tumida* var *pilbarensis, Corymbia zygophylla, Eragrostis eriopoda, Tephrosia rosea* var *glabrior* ms, *Triodia schinzii.*		
Sub-dominant or locally dominant species:	*Aristida holathera* var *holathera, Bonamia pannosa, Bonamia rosea, Corchorus elachocarpus, Corchorus parviflorus, Corymbia hamersleyana, Grevillea eriostachya, Grevillea wickhamii* subsp *macrodonta, Hakea macrocarpa, Halgania solanacea* var *solanacea, Hibiscus leptocladus, Jacksonia aculeata, Ptilotus polystachyus* var *arthrotrichus, Senna notabilis, Tephrosia monophylla.*		
Weeds:	No weeds recorded.		
Condition Rating:	Very good		

Sandplain *Acacia stellaticeps* Heath Open Woodland (burnt)

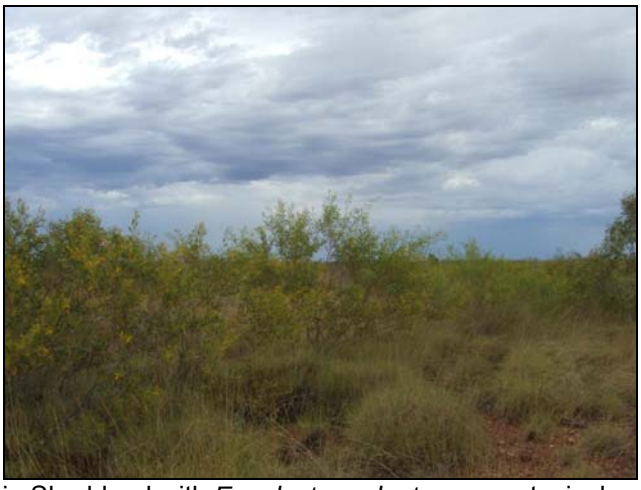
Sandplain *Acacia stellaticeps* Heath Open Woodland

Landform Type 13	Sandplain *Eucalyptus odontocarpa* Low Woodland		
Vegetation:	Native vegetation	**Area (ha):**	8.6
Landscape:	Low relief sandplain at base of colluvial hills		
Soil:	Red pindan sand with minor gravel		
Vegetation Structural Classification:	*Corymbia flavescens* scattered trees over *Eucalyptus odontocarpa* low scattered woodland over *Acacia ancistrocarpa, Acacia monticola, Acacia tumida* var *pilbarensis, Grevillea wickhamii* subsp *macrodonta* and *Petalostylis labicheoides* high open shrubland over *Bonamia pannosa* low open shrubland over *Eragrostis eriopoda* and *Triodia pungens* open hummock grassland.		
Burn Age:	Recent. A small unburnt patch was surveyed.		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia ancistrocarpa, Acacia monticola, Acacia tumida* var *pilbarensis, Bonamia pannosa, Corymbia flavescens, Eragrostis eriopoda, Eucalyptus odontocarpa, Grevillea wickhamii* subsp *macrodonta, Petalostylis labicheoides, Triodia pungens*		
Sub-dominant or locally dominant species:	*Abutilon otocarpum, Acacia colei* var *colei, Acacia stellaticeps, Aristida holathera* var *holathera, *Cenchrus ciliaris, Corymbia hamersleyana, Eriachne mucronata, Eucalyptus odontocarpa, Gossypium australe, Hakea lorea* subsp *lorea, Hakea macrocarpa, Hibiscus leptocladus, Isotropis atropurpurea, Sida cardiophylla, Tephrosia rosea* var *clementii, Yakirra australis*		
Weeds:	**Cenchrus ciliaris* in small patches.		
Condition Rating:	Good with some weed infestation (*Cenchrus ciliaris*).		

Sandplain *Eucalyptus odontocarpa* Low Woodland - typical vegetation (unburnt / burnt)

Sandplain *Eucalyptus odontocarpa* Low Woodland – soil surface

Landform Type 14	Sandplain Shrubland with *Eucalyptus odontocarpa*		
Vegetation:	Native vegetation	**Area (ha):**	25.0
Landscape:	Low relief sandplan at base of colluvial scree slopes and waste dumps.		
Soil:	Gravel scree over pindan sand		
Vegetation Structural Classification:	*Corymbia hamersleyana* scattered low trees over *Eucalyptus odontocarpa* low woodland over *Acacia acradenia, Grevillea wickhamii* subsp *macrodonta* and *Petalostylis labicheoides* high shrubland over *Triodia pungens* and *Triodia wiseana* hummock grassland.		
Burn Age:	> 3 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Triodia pungens, Acacia acradenia, Corymbia hamersleyana, Eucalyptus odontocarpa, Grevillea wickhamii* subsp *macrodonta, Petalostylis labicheoides, Triodia wiseana*		
Sub-dominant or locally dominant species:	*Acacia adoxa* var *adoxa, Acacia ancistrocarpa, Acacia inaequilatera, Acacia monticola, Bonamia media* var *villosa, Crotalaria medicaginea* subsp *neglecta, Goodenia candicans, Hybanthus aurantiacus, Isotropis atropurpurea, Mollugo molluginea, Ptilotus astrolasius* var *astrolasius, Ptilotus calostachyus* var *calostachyus*		
Weeds:	No weeds recorded.		
Condition Rating:	Very good		



Sandplain Shrubland with *Eucalyptus odontocarpa* – typical vegetation

Sandplain Shrubland with *Eucalyptus odontocarpa* – soil surface

Landform Type 15	Drainage Line Colluvial Hillside		
Vegetation:	Native vegetation	**Area (ha):**	11.0
Landscape:	Colluvial slope at base of hillside		
Soil:	Pebblestone to cobblestone creekbed		
Vegetation Structural Classification:	*Eucalyptus odontocarpa* low woodland over *Acacia acradenia, Acacia monticola, Acacia tumida* var *pilbarensis and Petalostylis labicheoides* closed scrub over *Triodia pungens* closed hummock grassland.		
Burn Age:	> 5 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia acradenia, Acacia monticola, Acacia tumida* var *pilbarensis, Eucalyptus odontocarpa, Petalostylis labicheoides, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia adoxa* var *adoxa, Acacia ancistrocarpa, Corchorus parviflorus, Cymbopogon ambiguus, Grevillea wickhamii* subsp *macrodonta, Sida cardiophylla, Tephrosia rosea* var *clementii, Waltheria indica*		
Weeds:	No weeds recorded		
Condition Rating:	Very good		

Drainage Line Colluvial Hillside – typical vegetation

Drainage Line Colluvial Hillside – soil surface

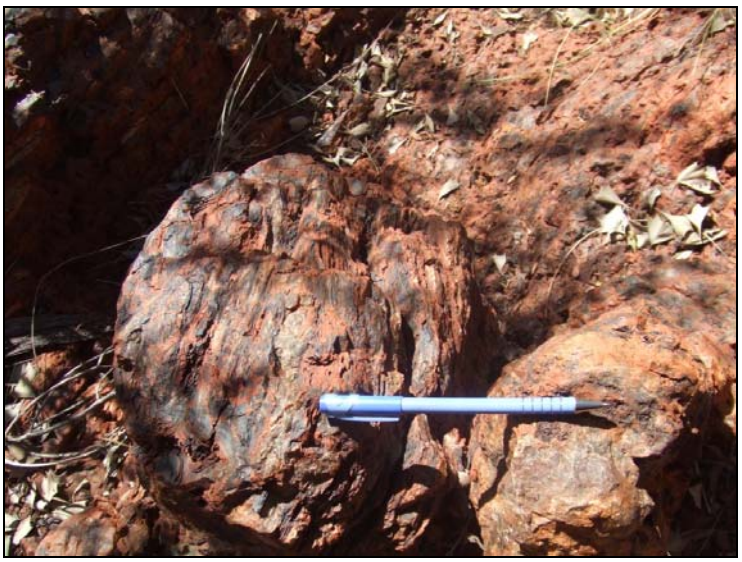
Landform Type 16	Drainage Line Deep Colluvial Creek		
Vegetation:	Native vegetation	**Area (ha):**	2.9
Landscape:	Colluvial slope at base of hillside		
Soil:	Pebblestone to cobblestone creekbed		
Vegetation Structural Classification:	*Acacia acradenia* and *Grevillea wickhamii* subsp *macrodonta* closed scrub over *Triodia ?epactia* hummock grassland.		
Burn Age:	> 5 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Triodia ?epactia, Acacia acradenia, Grevillea wickhamii* subsp *macrodonta, Petalostylis labicheoides*		
Sub-dominant or locally dominant species:	*Acacia adoxa* var *adoxa, Acacia monticola, Aristida holathera* var *holathera, Corchorus parviflorus, Corymbia hamersleyana, Goodenia candicans, Grevillea pyramidalis, Leptopus decaisnei, Petalostylis labicheoides*		
Weeds:	No weeds recorded		
Condition Rating:	Very good		

Drainage Line Deep Colluvial Creek – typical vegetation

Drainage Line Deep Colluvial Creek – soil surface

Landform Type 17	Drainage Line Rocky Hillside		
Vegetation:	Native vegetation	**Area (ha):**	3.4
Landscape:	Steep rocky hillsides		
Soil:	Rock outcrop and cobbletsones		
Vegetation Structural Classification:	*Corymbia hamersleyana* low open woodland over *Acacia acradenia, Acacia monticola* and *Grevillea wickhamii* subsp *macrodonta* closed scrub over *Triodia pungens* hummock grassland.		
Burn Age:	> 5 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia acradenia, Acacia monticola, Corymbia hamersleyana, Grevillea wickhamii* subsp *macrodonta, Triodia pungens*		
Sub-dominant or locally dominant species:	*Aristida holathera* var *holathera, Cajanus cinereus, *Cenchrus ciliaris, Cymbopogon obtectus, Hibiscus coatesii, Indigofera monophylla, Isotropis atropurpurea, Petalostylis labicheoides*		
Weeds:	**Cenchrus ciliaris* at one location.		
Condition Rating:	Very good to good.		

Drainage Line Rocky Hillside – typical vegetation



Drainage Line Rocky Hillside – ground surface

Landform Type 18	Drainage Line Medium Creek		
Vegetation:	Native vegetation	**Area (ha):**	3.9
Landscape:	Medium sized watercourse with defined creekbed, approximately 5 to 10m in width.		
Soil:	Pebblestone creekbed material		
Vegetation Structural Classification:	*Acacia tumida* var *pilbarensis, Grevillea wickhamii* subsp *macrodonta* and *Petalostylis labicheoides* open scrub over *Triodia pungens* hummock grassland		
Burn Age:	> 5 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia tumida* var *pilbarensis, Grevillea wickhamii* subsp *macrodonta, Petalostylis labicheoides, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia acradenia, Eriachne pulchella* subsp *dominii, Goodenia candicans, Tephrosia monophylla, Trachymene oleracea* subsp *oleracea*		
Weeds:	No weeds recorded		
Condition Rating:	Very good		

Drainage Line Medium Creek – typical vegetation

Drainage Line Medium Creek – creekbed

Landform Type 19	Drainage Line Broad Creek		
Vegetation:	Native vegetation	**Area (ha):**	3.7
Landscape:	Broad watercourse with well defined creekbed, approximately 10 to 12m in width.		
Soil:	Pebblestone to cobblestone creekbed material		
Vegetation Structural Classification:	*Corymbia hamersleyana* and *Terminalia canescens* scattered low trees over *Acacia bivenosa, Acacia pyrifolia* var *pyrifolia, Acacia tumida* var *pilbarensis* high open shrubland over **Cenchrus ciliaris* tussock grassland and *Triodia pungens* hummock grassland.		
Burn Age:	> 5 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia bivenosa, Acacia pyrifolia* var *pyrifolia, Acacia tumida* var *pilbarensis, *Cenchrus ciliaris, Corymbia hamersleyana, Terminalia canescens, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia acradenia, Atalaya hemiglauca, Corchorus parviflorus, Cyperus vaginatus, Eriachne mucronata, Grevillea wickhamii* subsp *macrodonta, Ipomoea muelleri, Petalostylis labicheoides, Tamarix aphylla, Waltheria indica*		
Weeds:	*Cenchrus ciliaris* and *Tamarix aphylla*		
Condition Rating:	Very poor due to massive weed infestation.		

Drainage Line Broad Creek – typical vegetation

Drainage Line Broad Creek – creekbed

Landform Type 20:	Mine Drainage Areas		
Vegetation:	Disturbed or cleared vegetation	**Area (ha):**	16.1
Landscape:	Drainage catchments from mining areas		
Soil:	Variable		
Vegetation Structural Classification:	No quadrats conducted.		
Burn Age:	Not applicable		
Conservation Taxa:	No conservation taxa recorded		
Dominant Species:	Not recorded		
Sub-dominant or locally dominant species:	Not recorded		
Weeds:	Patches of *Cenchrus ciliaris* observed.		
Condition Rating:	Completely degraded		

Mine Drainage Areas – ponding area

Mine Drainage Areas – ponding near waste dump

Landform Type 21:	Regrowth Infrastructure Areas		
Vegetation:	Regrowth	**Area (ha):**	30.5
Landscape:	Mine areas with natural regrowth, borrow pits, old tracks, hardstand		
Soil:	Variable, sand or gravel		
Vegetation Structural Classification:	Variable, shrublands and barren areas.		
Burn Age:	Variable		
Conservation Taxa:	No conservation taxa observed		
Dominant Species:	*Acacia acradenia, Acacia tumida* var *pilbarensis, Corymbia flavescens, Senna glutinosa* subsp *pruinosa, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia adoxa* var *adoxa, Acacia ancistrocarpa, Aristida holathera* var *holathera, *Cenchrus ciliaris, Corchorus elachocarpus, Corchorus parviflorus, Corymbia hamersleyana, Gomphrena canescens* subsp *canescens, Grevillea wickhamii* subsp *macrodonta, Hibiscus sturtii* var *campylochlamys, Isotropis atropurpurea, Cucumis maderaspatanus, Paspalidium basicladum, Pterocaulon serrulatum, Pterocaulon sphaeranthoides, Ptilotus calostachyus* var *calostachyus, Ptilotus obovatus* var *obovatus, Senna notabilis, Sida cardiophylla, Solanum diversiflorum, Tephrosia rosea* var *clementii*		
Weeds:	Major infestations of *Cenchrus ciliaris*		
Condition Rating:	Very poor due to weed infestation		

Regrowth Infrastructure Areas – Buffel Grass (*Cenchrus ciliaris*) infestation

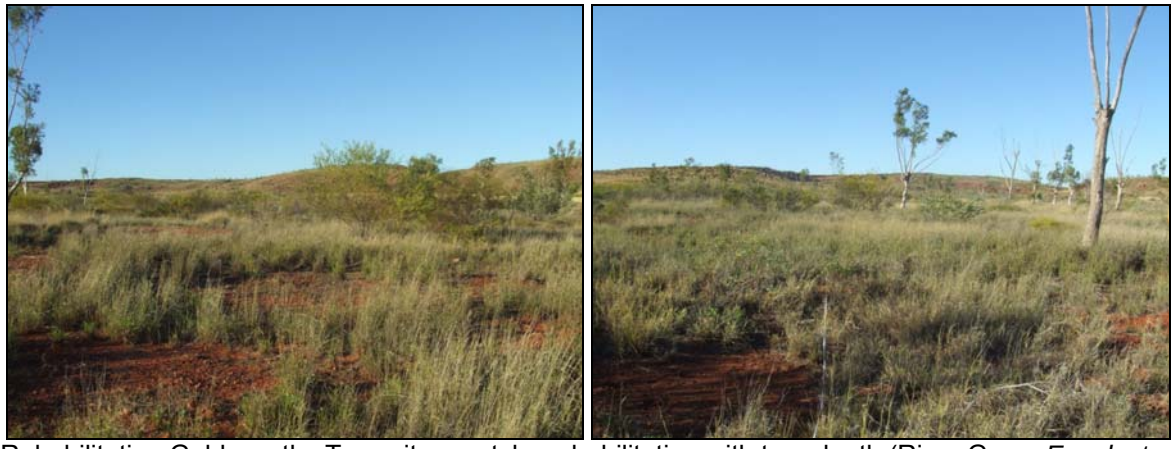
Regrowth Infrastructure Areas – Old borrow pit area

Landform Type 22:	Rehabilitation Gas Pipeline		
Vegetation:	Rehabilitation	**Area (ha):**	9.3
Landscape:	Sand plain		
Soil:	Pindan sand		
Vegetation Structural Classification:	Not recorded.		
Burn Age:	Recent to > 3 years.		
Conservation Taxa:	No conservation taxa observed.		
Dominant Species:	Not recorded.		
Sub-dominant or locally dominant species:	Not recorded.		
Weeds:	Not recorded.		
Condition Rating:	Not applicable. This is an infrastructure corridor held by Newcrest Mining Ltd.		

Rehabilitation Gas Pipeline – burnt area

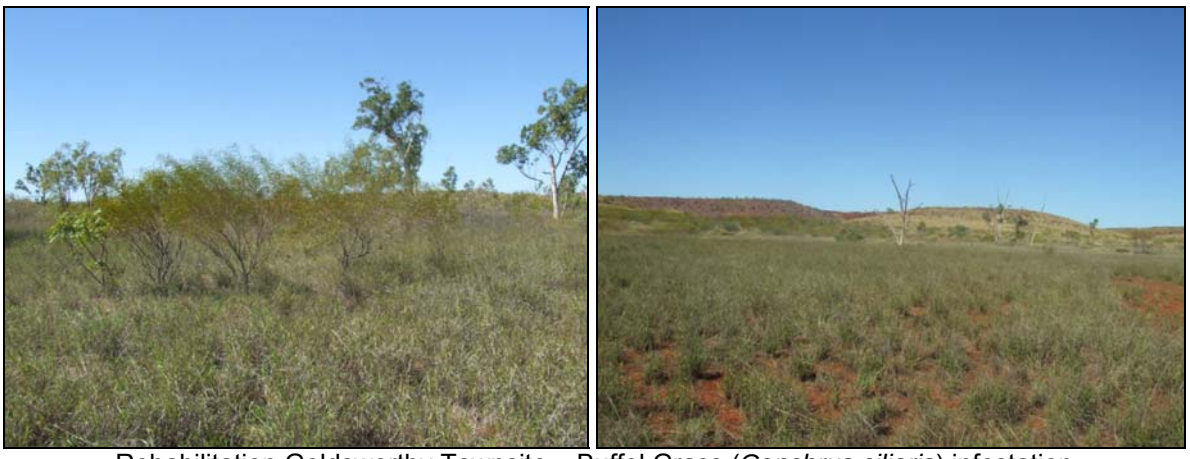
Rehabilitation Gas Pipeline – unburnt vegetation

Landform Type 23	Rehabilitation Goldsworthy Townsite		
Vegetation:	Rehabilitation	**Area (ha):**	51.1
Landscape:	Rehabilitated townsite. All infrastructure removed.		
Soil:	Disturbed soils, generally sand with areas of gravel scree.		
Vegetation Structural Classification:	*Eucalyptus camaldulensis* var *obtusa* scattered trees over *Acacia ancistrocarpa, Acacia bivenosa, Acacia acradenia, Acacia tumida* var *pilbarensis* and *Senna artemisioides* subsp *oligophylla* open shrubland over *Cenchrus ciliaris* tussock grassland over occasional areas of *Triodia pungens* open hummock grassland.		
Burn Age:	> 5 years		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	**Cenchrus ciliaris, Acacia ancistrocarpa, Acacia bivenosa, Acacia acradenia, Acacia tumida* var *pilbarensis, Eucalyptus camaldulensis* var *obtusa, Senna artemisioides* subsp *oligophylla, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia stellaticeps, Corchorus elachocarpus, Corchorus parviflorus, Corymbia hamersleyana, Eragrostis eriopoda, Petalostylis labicheoides, Pluchea tetranthera, Senna artemisioides* subsp *helmsii, Senna glutinosa* subsp *pruinosa, Senna notabilis, Sida arenicola, Sida cardiophylla, Triodia wiseana, *Vachellia farnesiana*		
Weeds:	Massive infestation of *Cenchrus ciliaris,* up to 70% cover is places.		
Condition Rating:	Very poor due to the *Cenchrus ciliaris* dominance.		



Rehabilitation Goldsworthy Townsite – patchy rehabilitation with tree death (River Gums *Eucalyptus camaldulensis* var *obtusa*)

Rehabilitation Goldsworthy Townsite – Areas of spinifex re-generation



Rehabilitation Goldsworthy Townsite – Buffel Grass (*Cenchrus ciliaris*) infestation

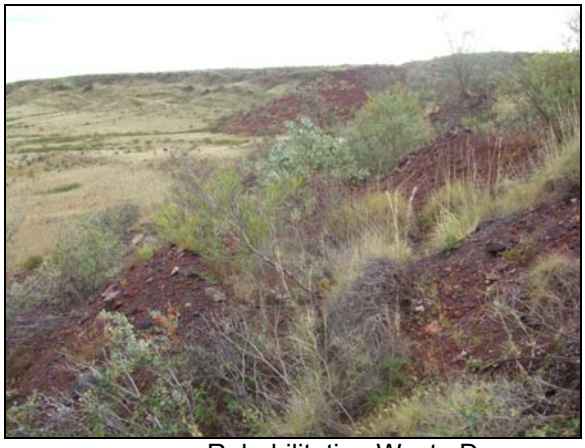
Landform Type 24:	Rehabilitation Infrastructure Areas		
Vegetation:	Rehabilitation	**Area (ha):**	107.5
Landscape:	Rehabilitated areas such as roads, hardstand and laydown areas.		
Soil:	Disturbed ground, often compacted gravels that have been ripped.		
Vegetation Structural Classification:	Variable structure, typically: *Acacia ancistrocarpa* and *Acacia tumida* var *pilbarensis* open shrubland over *Triodia angusta* and *Triodia pungens* open hummock grassland with areas of *Cenchrus ciliaris* tussock grassland.		
Burn Age:	Variable from very recent to burns to > 5 years.		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	*Acacia ancistrocarpa, Acacia inaequilatera, Acacia acradenia, Acacia stellaticeps, Acacia tumida* var *pilbarensis, *Cenchrus ciliaris, Corymbia hamersleyana, Cucumis maderaspatanus, Cymbopogon ambiguus, Eucalyptus odontocarpa, Grevillea wickhamii* subsp *macrodonta, Petalostylis labicheoides, Pterocaulon sphaeranthoides, Ptilotus exaltatus* var *exaltatus, Senna notabilis, Triodia angusta, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia bivenosa, Acacia colei* var *colei, Acacia monticola, Aerva javanica, Aristida inaequiglumis, Cleome viscosa, Corchorus elachocarpus, Corchorus parviflorus, Eriachne aristidea, Gomphrena affinis* subsp *pilbarensis, Gomphrena canescens* subsp *canescens, Salsola australis, Sesbania cannabina, Sida pilbarensis, Solanum horridum, Tephrosia rosea* var *clementii, Trianthema triquetra*		
Weeds:	*Cenchrus ciliaris* common in some areas, *Aerva javanica* occasionally recorded.		
Condition Rating:	Very poor		

Rehabilitation Infrastructure Areas – old borrow pits

Rehabilitation Infrastructure Areas – old stockpile areas

Rehabilitation Infrastructure Areas –
old hardstand areas with Buffel Grass (*Cenchrus ciliaris*) infestation

Landform Type 25	Rehabilitation Waste Dump		
Vegetation:	Rehabilitation	**Area (ha):**	195.4
Landscape:	Massive waste dumps with moonscaping on batters and ripping on top surfaces. Rehabilitation approximately 16 years old.		
Soil:	Mine waste rock, assorted size fractions from fines to massive boulders, some sulphidic shales.		
Vegetation Structural Classification:	Variable structure, typically shrublands and grasslands with patchy coverage and barren areas.		
Burn Age:	Variable burn ages		
Conservation Taxa:	No conservation taxa recorded		
Dominant Species:	*Salsola australis, *Aerva javanica, *Cenchrus ciliaris, Acacia tumida* var *pilbarensis, Cleome viscosa, Cucumis maderaspatanus, Cymbopogon ambiguus, Grevillea wickhamii* subsp *macrodonta, Pterocaulon sphaeranthoides, Ptilotus exaltatus* var *exaltatus, Triodia pungens*		
Sub-dominant or locally dominant species:	*Acacia colei* var *colei, Acacia maitlandii, Acacia pyrifolia* var *morrisonii, Aristida contorta, Capparis spinosa, Corchorus parviflorus, Corymbia hamersleyana, Gomphrena affinis* subsp *pilbarensis, Gomphrena canescens* subsp *canescens, Gossypium australe, Gossypium robinsonii, Indigofera trita, Paraneurachne muelleri, Pterocaulon serrulatum, Ptilotus obovatus* var *obovatus, Senna artemisioides* subsp *oligophylla, Senna glutinosa* subsp x *luerssenii, Swainsona formosa, Triumfetta chaetocarpa*		
Weeds:	*Aerva javanica* and *Cenchrus ciliaris* occurred occasionally. *Calotropis procera* was recorded from one location.		
Condition Rating:	Very poor		




Rehabilitation Waste Dump - vegetation on moonscaped batters


Rehabilitation Waste Dump

Landform Type 26	Disturbed Ground No Rehabilitation		
Vegetation:	No native vegetation	**Area (ha):**	11.5
Landscape:	Often hardstand areas.		
Soil:	Compact surfaces		
Vegetation Structural Classification:	No vegetation data recorded. Limited vegetation present		
Burn Age:	Limited vegetation present.		
Conservation Taxa:	No conservation taxa recorded.		
Dominant Species:	No vegetation data recorded		
Sub-dominant or locally dominant species:	No vegetation data recorded		
Weeds:	*Aerva javanica* observed on hardstand areas.		
Condition Rating:	Not applicable		

Disturbed Ground No Rehabilitation – old rail infrastructure

Disturbed Ground No Rehabilitation – old waste dump

Landform Type 27	Infrastructure		
Vegetation:	No native vegetation	**Area (ha):**	30.5
Landscape:	Variable, typically the railway and ballast embankment, roads and a telecommunication facility.		
Soil:	Engineered materials		
Vegetation Structural Classification:	Not applicable.		
Burn Age:	Not applicable.		
Conservation Taxa:	No conservation taxa recorded		
Dominant Species:	Not applicable.		
Sub-dominant or locally dominant species:	Not applicable.		
Weeds:	*Aerva javanica* observed on hardstand areas.		
Condition Rating:	Not applicable		

Infrastructure – Yarrie railway

Infrastructure – access road and laydown areas

Landform Type 28	Open Pits		
Vegetation:	No native vegetation	**Area (ha):**	60.2
Landscape:	Mine void, mine lake and pit benches		
Soil:	Not applicable		
Vegetation Structural Classification:	Not applicable		
Burn Age:	Not applicable		
Conservation Taxa:	No conservation taxa recorded		
Dominant Species:	Not applicable		
Sub-dominant or locally dominant species:	Not applicable		
Weeds:	*Cenchrus ciliaris* and *Aerva javanica* observed.		
Condition Rating:	Not applicable		

Open Pit – Goldsworthy Mine

Appendix D

List of all botanical taxa recorded during the Pilbara Flora vegetation survey

No.	Vegetation / Landform Type	No.	Vegetation / Landform Type
1	Hillside Spinifex Grassland	15	Drainage Line Colluvial Hillside
2	Hillside Spinifex Open Shrubland	16	Drainage Line Deep Colluvial Creek
3	Hillside Spinifex *Eucalyptus odontocarpa* Woodland	17	Drainage Line Rocky Hillside
4	Hillside Valley Shrubland	18	Drainage Line Medium Creek
5	Colluvial Slopes Spinifex Grassland	19	Drainage Line Broad Creek
6	Colluvial Slopes Spinifex Shrubland	20	Mine Drainage Area*
7	Rocky Narrow Valley	21	Regrowth Infrastructure Areas
8	Rocky Hillside *Terminalia canescens* Low Woodland	22	Rehabilitation Newcrest Mining Ltd's Gas Pipeline*
9	Sandplain Spinifex Shrubland Open Woodland	23	Rehabilitation Goldsworthy Townsite
10	Sandplain *Corymbia flavescens* Open Woodland	24	Rehabilitation Infrastructure Areas
11	Sandplain *Acacia stellaticeps* Heath	25	Rehabilitation Waste Dump
12	Sandplain *Acacia stellaticeps* Heath Open Woodland	26	Disturbed Ground No Rehabilitation*
13	Sandplain *Eucalyptus odontocarpa* Low Woodland	27	Infrastructure*
14	Sandplain Shrubland with *Eucalyptus odontocarpa*	28	Open Pit*

* Highly disturbed areas with little or no vegetation and the Newcrest Gas Pipeline corridor were not included in the vegetation survey area.

Fam No	Family	Taxa	Vegetated Landform Number																						
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	23	24	25
31	Poaceae	*Amphipogon sericeus*						√																	
31	Poaceae	*Aristida contorta*																							√
31	Poaceae	*Aristida holathera* var *holathera*									√			√	√			√	√	√		√			
31	Poaceae	*Aristida inaequiglumis*																						√	
31	Poaceae	*Cenchrus ciliaris**							√		√	√			√				√		√	√	√	√	√
31	Poaceae	*Chrysopogon fallax*															√								
31	Poaceae	*Cymbopogon ambiguus*							√	√							√							√	√
31	Poaceae	*Cymbopogon obtectus*			√														√						√
31	Poaceae	*Enneapogon polystachyus*																							
31	Poaceae	*Enneapogon robustissimus*								√															√
31	Poaceae	*Eragrostis cumingii*													√										
31	Poaceae	*Eragrostis eriopoda*									√	√	√	√	√								√		
31	Poaceae	*Eriachne aristidea*		√																				√	
31	Poaceae	*Eriachne lanata*		√				√																	
31	Poaceae	*Eriachne mucronata*		√		√			√	√					√						√				√
31	Poaceae	*Eriachne pulchella* subsp *dominii*		√				√	√											√					√
31	Poaceae	*Eriachne* sp																							√
31	Poaceae	*Paraneurachne muelleri*																							√
31	Poaceae	*Paspalidium basicladum*																				√			
31	Poaceae	*Sporobolus australasicus*																							√
31	Poaceae	*Triodia ?epactia*																√							
31	Poaceae	*Triodia angusta*																						√	
31	Poaceae	*Triodia pungens*	√	√	√	√	√	√	√	√	√	√	√		√	√	√		√	√	√	√	√	√	√
31	Poaceae	*Triodia schinzii*									√	√	√	√											
31	Poaceae	*Triodia wiseana*					√									√							√		
31	Poaceae	*Yakirra australis*													√										
32	Cyperaceae	*Bulbostylis barbata*		√						√										√					
32	Cyperaceae	*Cyperus blakeanus*											√												
32	Cyperaceae	*Cyperus cunninghamii*							√	√															
32	Cyperaceae	*Cyperus difformis*								√															
32	Cyperaceae	*Cyperus vaginatus*																			√				
87	Moraceae	*Ficus brachypoda*							√																
90	Proteaceae	*Grevillea eriostachya*												√											

Fam No	Family	Taxa	Vegetated Landform Number																						
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	23	24	25
90	Proteaceae	*Grevillea nematophylla* subsp *?supraplana*									√														
90	Proteaceae	*Grevillea pyramidalis*		√	√		√											√							
90	Proteaceae	*Grevillea wickhamii* subsp *macrodonta*	√	√	√	√	√	√	√		√		√		√	√	√	√	√	√	√	√		√	√
90	Proteaceae	*Hakea lorea* subsp l*orea*										√			√										
90	Proteaceae	*Hakea macrocarpa*		√							√		√	√	√										
105	Chenopodiaceae	*Dysphania rhadinostachya* subsp *rhadinostachya*		√																					
105	Chenopodiaceae	*Salsola australis*					√																	√	√
106	Amaranthaceae	*Aerva javanica**																						√	√
106	Amaranthaceae	*Amaranthus mitchellii*							√	√															
106	Amaranthaceae	*Gomphrena affinis* subsp *pilbarensis*																						√	√
106	Amaranthaceae	*Gomphrena canescens* subsp *canescens*							√	√	√											√		√	√
106	Amaranthaceae	*Ptilotus arthrolasius*									√			√											
106	Amaranthaceae	*Ptilotus astrolasius* var *astrolasius*									√	√		√	√	√									
106	Amaranthaceae	*Ptilotus axillaris*													√										
106	Amaranthaceae	*Ptilotus calostachyus* var *calostachyus*		√	√		√	√			√	√		√	√	√	√					√			
106	Amaranthaceae	*Ptilotus exaltatus* var *exaltatus*			√						√													√	√
106	Amaranthaceae	*Ptilotus fusiformis* var *fusiformis*																							
106	Amaranthaceae	*Ptilotus incanus* var *incanus*																							
106	Amaranthaceae	*Ptilotus obovatus* var *obovatus*			√																	√			√
106	Amaranthaceae	*Ptilotus polystachyus* var *arthrotricha*									√			√											
107	Nyctaginaceae	*Boerhavia gardneri*																							√
108	Gyrostemonaceae	*Codonocarpus cotinifolius*									√														
110A	Molluginaceae	*Mollugo molluginea*						√			√	√	√	√	√	√	√								
110	Aizoaceae	*Trianthema pilosa*									√			√											
110	Aizoaceae	*Trianthema triquetra*																						√	
113	Caryophyllaceae	*Polycarpaea holtzei*		√						√													√		
122	Menispermaceae	*Tinospora smilacina*			√													√							

Fam No	Family	Taxa	Vegetated Landform Number																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	23	24	25
131	Lauraceae	*Cassytha capillaris*						√																	
137A	Capparaceae	*Capparis spinosa*																							√
137A	Capparaceae	*Cleome uncifera*									√			√											
137A	Capparaceae	*Cleome viscosa*							√	√	√										√			√	√
163	Mimosaceae	*Acacia acradenia*		√	√	√	√	√	√	√	√	√				√	√	√	√	√	√	√	√	√	
163	Mimosaceae	*Acacia adoxa* var *adoxa*	√	√	√	√		√		√						√	√	√				√			
163	Mimosaceae	*Acacia ancistrocarpa*	√	√	√		√	√			√	√	√	√	√	√	√					√	√	√	
163	Mimosaceae	*Acacia bivenosa*									√										√		√	√	
163	Mimosaceae	*Acacia colei* var *colei*			√					√	√				√									√	√
163	Mimosaceae	*Acacia inaequilatera*	√	√	√		√		√			√				√								√	
163	Mimosaceae	*Acacia maitlandii*																							√
163	Mimosaceae	*Acacia monticola*	√	√	√	√		√		√					√	√	√	√	√	√				√	
163	Mimosaceae	*Acacia pyrifolia* var *morrisonii*																							√
163	Mimosaceae	*Acacia pyrifolia* var *pyrifolia*																			√				
163	Mimosaceae	*Acacia stellaticeps*						√			√	√	√	√	√								√	√	
163	Mimosaceae	*Acacia tumida* var *pilbarensis*		√					√		√	√	√	√	√		√			√	√	√	√	√	√
163	Mimosaceae	*Vachellia farnesiana**																					√		
164	Caesalpiniaceae	*Petalostylis labicheoides*		√			√	√	√			√			√	√	√	√	√	√	√		√	√	
164	Caesalpiniaceae	*Senna artemisioides* subsp *helmsii*									√												√		
164	Caesalpiniaceae	*Senna artemisioides* subsp *oligophylla*		√							√												√		√
164	Caesalpiniaceae	*Senna glutinosa* subsp *glutinosa*	√		√					√															
164	Caesalpiniaceae	*Senna glutinosa* subsp *pruinosa*																				√	√		
164	Caesalpiniaceae	*Senna glutinosa* subsp x *luerssenii*																							√
164	Caesalpiniaceae	*Senna notabilis*		√	√	√					√			√	√							√	√	√	
164	Caesalpiniaceae	*Senna venusta*																							
165	Papilionaceae	*Cajanus cinereus*				√													√	√					
165	Papilionaceae	*Cajanus marmoratus*													√										
165	Papilionaceae	*Crotalaria medicaginea* subsp *neglecta*							√	√					√	√	√								
165	Papilionaceae	*Crotalaria novae-hollandiae* subsp *novae-hollandiae*				√																			
165	Papilionaceae	*Crotalaria ramosissima*									√				√										

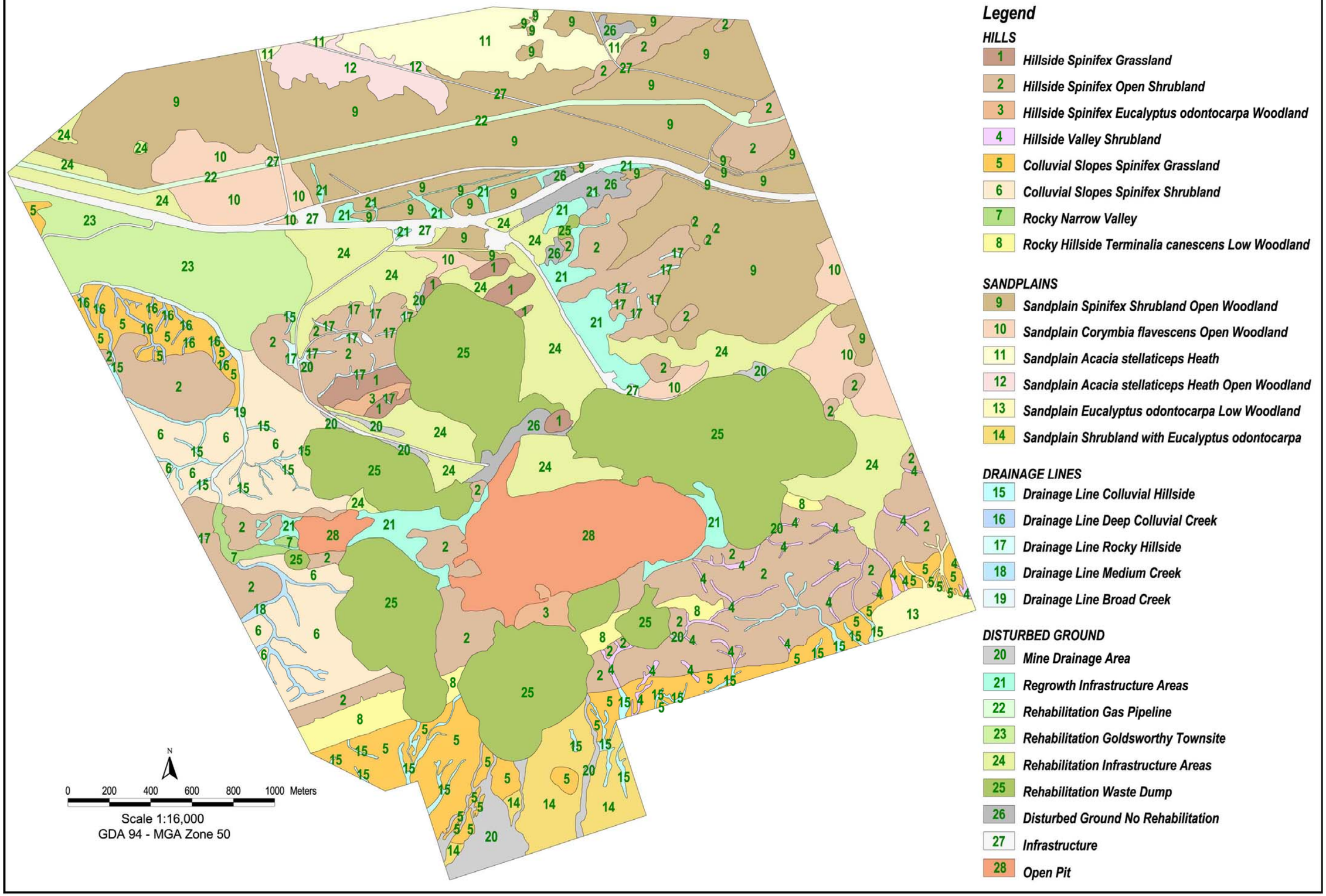
Fam No	Family	Taxa	Vegetated Landform Number																						
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	23	24	25
165	Papilionaceae	*Cullen stipulaceum*		√																					
165	Papilionaceae	*Indigofera monophylla*				√			√										√						
165	Papilionaceae	*Indigofera trita*																							√
165	Papilionaceae	*Isotropis atropurpurea*						√			√	√			√	√	√		√	√		√			
165	Papilionaceae	*Jacksonia aculeata*		√				√			√	√		√											
165	Papilionaceae	*Rhynchosia minima*		√		√			√	√												√			
165	Papilionaceae	*Sesbania cannabina*																						√	
165	Papilionaceae	*Swainsona formosa*																							√
165	Papilionaceae	*Tephrosia monophylla*		√				√		√				√						√					
165	Papilionaceae	*Tephrosia rosea* var *clementii*	√	√	√	√		√	√		√				√		√					√		√	
165	Papilionaceae	*Tephrosia rosea* var *glabrior* ms									√	√		√											
165	Papilionaceae	*Tephrosia* sp Bungaroo Creek (ME Trudgen 11601)		√				√			√														
165	Papilionaceae	*Tephrosia virens*		√				√	√																
173	Zygophyllaceae	*Tribulus hirsutus*						√			√			√											
185	Euphorbiaceae	*Euphorbia australis*																							
185	Euphorbiaceae	*Euphorbia boophthona*			√																				
185	Euphorbiaceae	*Euphorbia clementii* (P2)																							
185	Euphorbiaceae	*Euphorbia cleome*							√																
185	Euphorbiaceae	*Euphorbia coghlanii*							√																
185	Euphorbiaceae	*Flueggea virosa* subsp *melanthesioides*								√															
185	Euphorbiaceae	*Leptopus decaisnei*							√									√							
185	Euphorbiaceae	*Phyllanthus maderaspatensis*							√																
207	Sapindaceae	*Atalaya hemiglauca*				√			√	√											√				√
207	Sapindaceae	*Dodonaea coriacea*									√														
220	Tiliaceae	*Corchorus elachocarpus*						√			√	√	√	√	√							√	√	√	
220	Tiliaceae	*Corchorus laniflorus*		√																					
220	Tiliaceae	*Corchorus parviflorus*	√	√	√	√	√	√	√	√				√			√	√			√	√	√	√	√
220	Tiliaceae	*Corchorus* sp.					√				√	√		√											
220	Tiliaceae	*Corchorus tectus?*																		√					
220	Tiliaceae	*Triumfetta maconochieana*		√	√																				
220	Tiliaceae	*Triumfetta chaetocarpa*		√				√																	√
220	Tiliaceae	*Triumfetta deserticola*																							
220	Tiliaceae	*Triumfetta* sp.																		√					

Fam No	Family	Taxa	Vegetated Landform Number																						
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	23	24	25
221	Malvaceae	*Abutilon lepidum*							√																
221	Malvaceae	*Abutilon otocarpum*									√				√										
221	Malvaceae	*Gossypium australe*				√				√					√										√
221	Malvaceae	*Gossypium robinsonii*																							√
221	Malvaceae	*Hibiscus coatesii*																	√						
221	Malvaceae	*Hibiscus leptocladus*		√		√					√		√	√	√										
221	Malvaceae	*Hibiscus sturtii* var. *campylochlamys*																				√			
221	Malvaceae	*Sida arenicola*																					√		
221	Malvaceae	*Sida cardiophylla*		√				√							√		√					√	√		
221	Malvaceae	*Sida echinocarpa*									√						√								√
221	Malvaceae	*Sida pilbarensis*			√																			√	
221	Malvaceae	*Sida rohlenae* subsp?							√																
221	Malvaceae	*Sida* sp?									√														
221	Malvaceae	*Sida subarticulata*							√								√								
223	Sterculiaceae	*Waltheria indica*															√				√				
237	Tamaricaceae	*Tamarix aphylla*																			√				
243	Violaceae	*Hybanthus aurantiacus*								√	√		√		√	√				√	√				
272	Combretaceae	*Terminalia canescens*		√		√			√	√	√										√				
273	Myrtaceae	*Calytrix carinata*												√											
273	Myrtaceae	*Corymbia ?opaca*		√		√																			
273	Myrtaceae	*Corymbia flavescens*										√			√							√			
273	Myrtaceae	*Corymbia hamersleyana*		√	√	√		√	√		√	√	√	√	√	√		√	√	√	√	√	√	√	√
273	Myrtaceae	*Corymbia zygophylla*									√			√											√
273	Myrtaceae	*Eucalyptus camaldulensis* var *obtusa*										√											√		
273	Myrtaceae	*Eucalyptus odontocarpa*	√		√	√				√					√	√	√						√	√	
273	Myrtaceae	*Melaleuca lasiandra*																							
281	Apiaceae	*Trachymene oleracea* subsp *oleracea*		√	√	√			√		√						√			√					
305	Asclepiadaceae	*Calotropis procera**																							
305	Asclepiadaceae	*Cynanchum floribundum*			√																				√
307	Convolvulaceae	*Bonamia media* var *villosa*	√	√	√											√									
307	Convolvulaceae	*Bonamia pannosa*									√	√		√	√										
307	Convolvulaceae	*Bonamia rosea*									√			√											

Fam No	Family	Taxa	Vegetated Landform Number																						
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	23	24	25
307	Convolvulaceae	*Evolvulus alsinoides* var *decumbens*							√																
307	Convolvulaceae	*Evolvulus alsinoides* var *villosicalyx*							√	√															
307	Convolvulaceae	*Ipomoea muelleri*																			√				
307	Convolvulaceae	*Polymeria ambigua*				√		√			√			√											
308	Apocynaceae	*Carissa lanceolata*								√															
310	Boraginaceae	*Ehretia saligna* var *saligna*								√															
310	Boraginaceae	*Halgania solanacea* var *solanacea*												√											
310	Boraginaceae	*Heliotropium pachyphyllum*						√																	
310	Boraginaceae	*Heliotropium vestitum*									√			√											
313	Lamiaceae	*Newcastelia cladotricha*									√														
315	Solanaceae	*Nicotiana occidentalis*							√	√															
315	Solanaceae	*Solanum ?ellipticum*			√						√													√	√
315	Solanaceae	*Solanum dioicum*		√			√													√					
315	Solanaceae	*Solanum diversiflorum*						√			√			√								√			
315	Solanaceae	*Solanum horridum*				√					√													√	√
316	Stemodia	*Stemodia grossa*																							
316	Stemodia	*Stemodia viscosa*																			√				
317	Bignoniaceae	*Dolichandrone heterophylla*									√														
331	Rubiaceae	*Oldenlandia crouchiana*		√																					
337	Cucurbitaceae	*Citrullus colocynthis*																							
337	Cucurbitaceae	*Cucumis maderaspatanus*			√				√	√	√				√					√		√		√	√
341	Goodeniaceae	*Dampiera candicans*		√		√		√			√		√	√	√	√	√	√		√					
341	Goodeniaceae	*Goodenia armitiana*									√														
341	Goodeniaceae	*Goodenia microptera*									√				√										
341	Goodeniaceae	*Goodenia stobbsiana*						√																	
345	Asteraceae	*Blumea tenella*																		√					
345	Asteraceae	*Pluchea ferdinandi- muelleri*											√												
345	Asteraceae	*Pluchea rubelliflora*																			√				
345	Asteraceae	*Pluchea tetranthera*		√				√					√				√				√		√		
345	Asteraceae	*Pterocaulon serrulatum*			√										√							√			√
345	Asteraceae	*Pterocaulon sphaeranthoides*		√									√									√		√	√

Appendix E

Maps of vegetation types recorded at Goldsworthy



Map 1: Map of vegetation types at the Goldsworthy Mine

Legend

HILLS

1	Hillside Spinifex Grassland
2	Hillside Spinifex Open Shrubland
3	Hillside Spinifex Eucalyptus odontocarpa Woodland
4	Hillside Valley Shrubland
5	Colluvial Slopes Spinifex Grassland
6	Colluvial Slopes Spinifex Shrubland
7	Rocky Narrow Valley
8	Rocky Hillside Terminalia canescens Low Woodland

SANDPLAINS

9	Sandplain Spinifex Shrubland Open Woodland
10	Sandplain Corymbia flavescens Open Woodland
11	Sandplain Acacia stellaticeps Heath
12	Sandplain Acacia stellaticeps Heath Open Woodland
13	Sandplain Eucalyptus odontocarpa Low Woodland
14	Sandplain Shrubland with Eucalyptus odontocarpa

DRAINAGE LINES

15	Drainage Line Colluvial Hillside
16	Drainage Line Deep Colluvial Creek
17	Drainage Line Rocky Hillside
18	Drainage Line Medium Creek
19	Drainage Line Broad Creek

DISTURBED GROUND

20	Mine Drainage Area
21	Regrowth Infrastructure Areas
22	Rehabilitation Gas Pipeline
23	Rehabilitation Goldsworthy Townsite
24	Rehabilitation Infrastructure Areas
25	Rehabilitation Waste Dump
26	Disturbed Ground No Rehabilitation
27	Infrastructure
28	Open Pit

Map 2: Map of outline of vegetation types on the orthophoto of the Goldsworthy Mine

Appendix F

Location of introduced species

Weed species	Common name	Easting	Nothing
**Aerva javanica*	Kapok Bush	764660	7746502
**Aerva javanica*	Kapok Bush	764217	7747842
**Aerva javanica*	Kapok Bush	763977	7747312
**Calotropis procera*	Calotropis	764827	7747908
**Cenchrus ciliaris*	Buffel Grass	763625	7748279
**Cenchrus ciliaris*	Buffel Grass	762514	7749182
**Cenchrus ciliaris*	Buffel Grass	763235	7749561
**Cenchrus ciliaris*	Buffel Grass	766490	7747109
**Cenchrus ciliaris*	Buffel Grass	766169	7747413
**Cenchrus ciliaris*	Buffel Grass	764660	7746502
**Cenchrus ciliaris*	Buffel Grass	764126	7748705
**Cenchrus ciliaris*	Buffel Grass	764178	7748677
**Cenchrus ciliaris*	Buffel Grass	764076	7747871
**Cenchrus ciliaris*	Buffel Grass	765068	7749363
**Cenchrus ciliaris*	Buffel Grass	764217	7747842
**Cenchrus ciliaris*	Buffel Grass	763166	7747308
**Cenchrus ciliaris*	Buffel Grass	763069	7749161
**Cenchrus ciliaris*	Buffel Grass	762951	7748745
**Cenchrus ciliaris*	Buffel Grass	763105	7748675
**Cenchrus ciliaris*	Buffel Grass	762505	7748617
**Cenchrus ciliaris*	Buffel Grass	763384	7748609
**Cenchrus ciliaris*	Buffel Grass	763698	7748847
**Cenchrus ciliaris*	Buffel Grass	762462	7748862
**Cenchrus ciliaris*	Buffel Grass	762323	7749246
**Tamarix aphylla*	Athel Pine	762505	7748617
**Vachellia farnesiana*	Mimosa Bush	762951	7748745
**Vachellia farnesiana*	Mimosa Bush	763384	7748609

Appendix G

Quadrat data sheets

Quadrat No	MGA 1994 Zone 50		Quadrat No	MGA 1994 Zone 50	
	Easting	Northing		Easting	Northing
Q1	765705	7749280	Q26	763172	7747312
Q2	765433	7748999	Q27	763377	7747441
Q3	763737	7748066	Q28	765899	7747558
Q4	763580	7748281	Q29	763030	7749173
Q5	762553	7749203	Q30	762990	7748711
Q6	763205	7749583	Q31	763133	7748655
Q7	763616	7749167	Q32	762579	7748599
Q8	766549	7747084	Q33	762741	7748384
Q9	766119	7747420	Q34	762839	7748368
Q10	764955	7746154	Q35	763365	7748641
Q11	764459	7746225	Q36	763720	7748823
Q12	764176	7746154	Q37	762522	7748805
Q13	764185	7748710	Q38	763837	7748476
Q14	765188	7748713	Q39	764707	7747023
Q15	765882	7748605	Q40	762293	7749268
Q16	764075	7747905	Q41	764223	7749804
Q17	762947	7748109	Q42	764145	7749554
Q18	763089	7747464	Q43	763291	7747691
Q19	765176	7749864	Q44	763754	7748347
Q20	765087	7749393	Q45	764091	7748700
Q21	763796	7746556	Q46	764403	7748614
Q22	764024	7746264	Q47	764409	7748621
Q23	763700	7746333	Q48	763947	7747279
Q24	763302	7747053	Q49	763947	7747279
Q25	763439	7746832	Q50	764637	7748806

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	1
Survey Area:	50 x 50 m	**Date:**	11 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	765705	7749280
Habitat:	Small rocky hill		
Soil:	Quartz rocky outcropping with red silt soils.		
Rock Type:	Quartz chert		
Vegetation:	*Grevillea wickhamii* low open shrubland over spinifex hummock grassland		
Fire Age:	>5 years		
Comments:	Vegetation in good condition		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.2	+	
Acacia ancistrocarpa	2.5	2	
Acacia inaequilatera	3.0	+	
Acacia tumida var. *pilbarensis*	2.0	+	
Corymbia hamersleyana	4.0	+	
Grevillea wickhamii subsp. *macrodonta*	2-4	20	
Jacksonia aculeata	0.5	+	
Triodia pungens	0.5	60	
Cullen stipulaceum	0.75	+	Outside quadrat
Hakea macrocarpa	1.5	+	Outside quadrat

Quadrat 1

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	2
Survey Area:	50 x 50 m	**Date:**	11 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	765433	7748999
Habitat:	Sand plain		
Soil:	Pindan red sand		
Rock Type:	No rock present		
Vegetation:	*Corymbia zygophylla* low open woodland over *Acacia tumida* low shrubland over *Triodia schinzii* hummock grassland.		
Fire Age:	Recent >2 years		
Comments:	Vegetation community is post fire stage, numerous small shrubs		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia stellaticeps	0.5	+	
Acacia tumida var. *pilbarensis*	1.5	15	
Bonamia pannosa	0.5	3	
Corchorus elachocarpus	0.5	+	
Corymbia zygophylla	3	5	
Eragrostis eriopoda	0.3	1	
Goodenia armitiana	0.5	+	
Hibiscus leptocladus	0.25	+	
Dampiera candicans	0.5	+	
Heliotropium vestitum	0.25	+	
Jacksonia aculeata	0.5	2	
Mollugo molluginea	0.25	+	
Ptilotus arthrolasius	0.5	1	
Ptilotus astrolasius var. astrolasius	0.5	+	
Senna notabilis	0.25	+	
Tephrosia rosea var. *clementii*	0.25	2	
Tephrosia rosea var. *glabrior* ms	0.5	+	
Trianthema pilosa	0.25	+	
Triodia schinzii	0.5	+	(possibly 30% cover pre-fire)

Quadrat 2

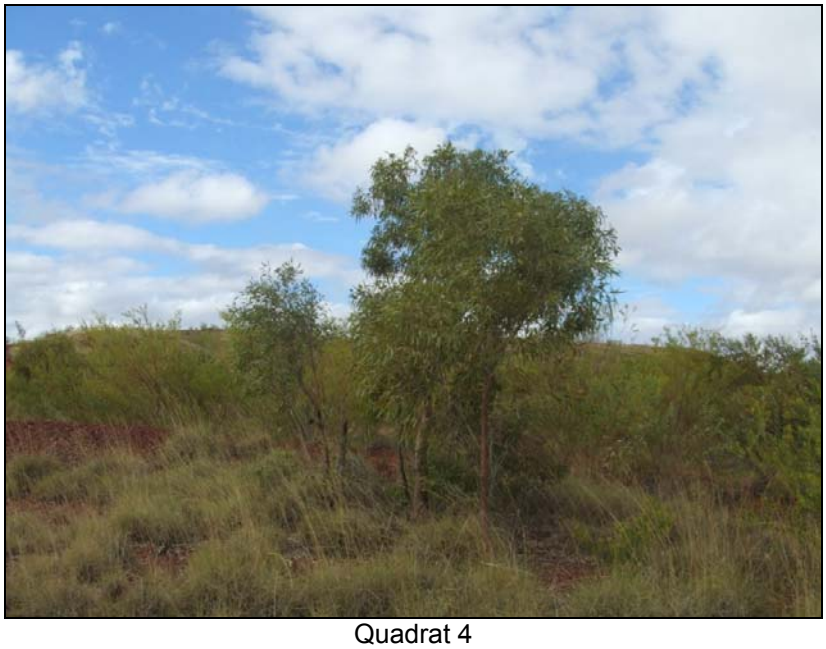
Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	3
Survey Area:	50 x 50 m	**Date:**	11 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763737	7748066
Habitat:	Rolling spinifex covered hills		
Soil:	Pebble stone colluvial hillside scree		
Rock Type:	Quartzite chert		
Vegetation:	Spinifex hummock grassland dominated community with scattered shrubs.		
Fire Age:	> 5 years		
Comments:	*Eucalyptus odontocarpa* mallee low open woodland commences immediately to south on southern slopes		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.25	2	
Acacia ancistrocarpa	2	+	
Acacia inaequilatera	3	+	
Acacia monticola	1.5	+	
Bonamia media var. *villosa*	0.25	+	
Corchorus parviflorus	0.25	+	
Eucalyptus odontocarpa	2	1	
Grevillea wickhamii subsp. *macrodonta*	3	+	
Senna glutinosa subsp. *glutinosa*	1.5	+	
Tephrosia rosea var. *clementii*	0.5	+	
Triodia pungens	0.5	50	
Tephrosia rosea var. *glabrior* ms	0.5	+	

Quadrat 3

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	4
Survey Area:	100 x 10 m	**Date:**	11 June 2008
Method:	GPS for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763580	7748281
Habitat:	Hillside drainage line		
Soil:	Rocky cobblestones and silt		
Rock Type:	Ironstone		
Vegetation:	*Acacia acradenia* and *Acacia monticola* dense thickets co-dominant over dense *Triodia pungens*		
Fire Age:	>10 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia acradenia	2-3	40	
Acacia monticola	2-3	30	
Aristida holathera var. *holathera*	0.75	+	
Cajanus cinereus	0.5	+	
**Cenchrus ciliaris*	0.75	3	
Corymbia hamersleyana	5	2	
Cymbopogon obtectus	0.75	+	
Indigofera monophylla	0.5	+	
Isotropis atropurpurea	0.75	+	
Petalostylis labicheoides	2	+	
Triodia pungens	0.5	80	



Quadrat 4

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	5
Survey Area:	50 x 50 m	**Date:**	11 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	762553	7749203
Habitat:	Pindan sand plains		
Soil:	Pindan stoney sand, red		
Rock Type:	-		
Vegetation:	*Corymbia hamersleyana* scattered trees over *Acacia acradenia* sghrubland over *Triodia pungens* hummock grassland.		
Fire Age:	> 5 years		
Comments:	Some areas disturbed.		

Species	Height (m)	Cover (%)	Comments
Acacia ancistrocarpa	1.5	+	
Acacia bivenosa	1.5	+	
Acacia acradenia	1.75	40	
Acacia stellaticeps	0.5	20	
Acacia tumida var. *pilbarensis*	1.5	+	
Bonamia media var. *villosa*	0.5	+	
**Cenchrus ciliaris*	0.5	1	
Corymbia hamersleyana	4	2	
Eragrostis eriopoda	0.5	+	
Jacksonia aculeata	0.75	+	
Ptilotus astrolasius var. *astrolasius*	1	+	
Ptilotus calostachyus var. *calostachyus*	0.75	+	
Senna artemisioides subsp. *helmsii*	1.5	+	
Triodia pungens	0.5	70	
Triodia schinzii	1.5	2	

Quadrat 5

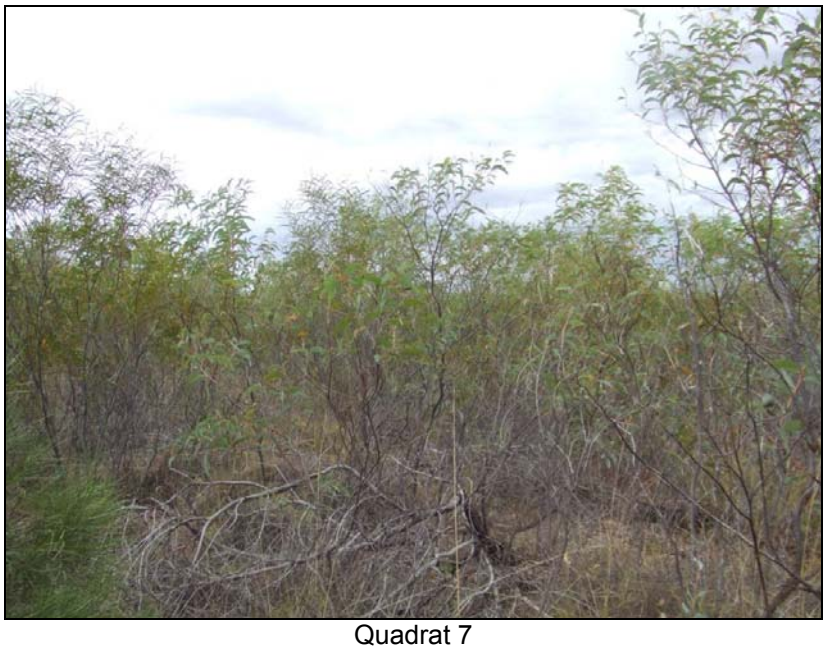
Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	6
Survey Area:	50 x 50 m	**Date:**	12 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763205	7749583
Habitat:	Pindan scrub (burnt)		
Soil:	Pindan sand		
Rock Type:	No rock present on surface		
Vegetation:	*Dolichandrone heterophylla* scattered trees over *Acacia tumida* over *Aristida holathera* and *Acacia* sp low shrubland		
Fire Age:	> 1 year		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	2	+	
Acacia stellaticeps	0.75	2	
Acacia tumida var. *pilbarensis*	2	2	
Aristida holathera var. *holathera*	0.5	30	
Bonamia media var. *villosa*	0.25	+	
Bonamia pannosa	0.5	+	
Bonamia rosea	0.5	+	
**Cenchrus ciliaris*	0.5	3	
Corchorus elachocarpus	1	+	
Corchorus sp.	0.75	+	
Corymbia hamersleyana	4	+	
Crotalaria ramosissima	0.5	+	
Cucumis maderaspatanus	0.5	+	
Dolichandrone heterophylla	4	2	
Eragrostis eriopoda	0.5	3	
Gomphrena canescens subsp. *canescens*	0.25	+	
Heliotropium vestitum	1	+	
Hibiscus leptocladus	0.75	+	
Hybanthus aurantiacus	0.3	+	
Jacksonia aculeata	1.5	+	
Polymeria ambigua	0.25	+	
Ptilotus astrolasius var. *astrolasius*	0.75	+	
Senna artemisioides subsp. *oligophylla*	0.5	+	
Tephrosia rosea var. *clementii*	0.5	+	
Tephrosia rosea var. *glabrior* ms	0.5	+	
Triodia schinzii	1.5	+	

Quadrat 5

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	7
Survey Area:	50 x 50 m	**Date:**	12 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763616	7749167
Habitat:	Pindan scrub		
Soil:	Pindan sand		
Rock Type:	No rock present on surface		
Vegetation:	Emergent *Corymbia ferriticola* over *Acacia ancistrocarpa Acacia tumida* tall shrubland over *Triodia schinzii* 0.5m hummock grasland		
Fire Age:	> 5 to 7 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	3	40	
Acacia tumida var. *pilbarensis*	3	40	
Bonamia pannosa	0.5	+	
Corchorus elachocarpus	0.5	+	
Eragrostis eriopoda	0.5	+	
Grevillea wickhamii subsp. *macrodonta*	2	+	
Hakea macrocarpa	2	+	
Hybanthus aurantiacus	0.5	+	
Polymeria ambigua	0.25	+	
Ptilotus astrolasius var. *astrolasius*	0.75	+	
Tephrosia rosea var. *glabrior* ms	0.5	+	
Triodia schinzii	0.5	60	



Quadrat 7

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	8
Survey Area:	50 x 50 m	**Date:**	12 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	766549	7747084
Habitat:	Pindan – at base of of hillsides		
Soil:	Red sandy pindan		
Rock Type:	No rock present on surface		
Vegetation:	Emergent *Coymbia hamersleyana* and *Corymbia flavescens* over dense mixed species shrubland.		
Fire Age:	> 5 to 7 years		
Comments:	Small unburnt patch on sandplains to south of hills		

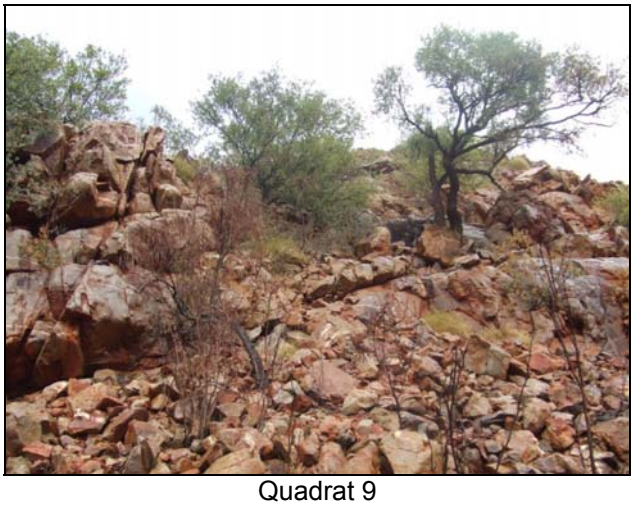
Species	**Height (m)**	**Cover (%)**	**Comments**
Abutilon otocarpum	0.5	+	
Acacia adoxa var. *adoxa*	0.5	+	
Acacia ancistrocarpa	3	10	
Acacia colei var. *colei*	3	+	
Acacia monticola	2.5	5	
Acacia stellaticeps	1.0	+	
Acacia tumida var. *pilbarensis*	3	30	
Aristida holathera var. *holathera*	0.5	+	
Bonamia pannosa	0.25	10	
Cajanus marmoratus	0.25	+	
**Cenchrus ciliaris*	0.5	+	
Corchorus elachocarpus	0.5	+	
Corymbia hamersleyana	6-8	+	
Crotalaria medicaginea subsp. *neglecta*	0.25	+	
Crotalaria ramosissima	0.25	+	
Cucumis maderaspatanus	0.25	+	
Eragrostis cumingii	0.5	+	
Eragrostis eriopoda	0.5	30	
Eriachne mucronata	0.5	+	
Eucalyptus odontocarpa	2.5	+	
Dampiera candicans	0.25	+	
Goodenia microptera	0.5	+	
Gossypium australe	0.25	+	
Grevillea wickhamii subsp. *macrodonta*	2	5	
Hakea lorea subsp. *lorea*	1.5	+	
Hakea macrocarpa	1.5	+	
Hibiscus leptocladus	0.5	+	
Hybanthus aurantiacus	0.5	+	
Isotropis atropurpurea	0.5	+	
Mollugo molluginea	0.25	+	
Petalostylis labicheoides	2	5	
Pterocaulon serrulatum	0.5	+	
Ptilotus astrolasius var. *astrolasius*	0.5	+	
Ptilotus axillaris	0.25	+	
Ptilotus calostachyus var. *calostachyus*	0.5	+	
Senna notabilis	0.5	+	
Sida cardiophylla	0.25	+	
Tephrosia rosea var. *clementii*	0.5	+	
Triodia pungens	0.75	2	
Yakirra australis	0.25	+	
Corymbia flavescens	10	2	Not in quadrat

Quadrat 8 unburnt

Quadrat 8 burnt

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	9
Survey Area:	75 x 20 m	**Date:**	13 June 2008
Method:	GPS for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	766119	7747420
Habitat:	Rocky hillside		
Soil:	Rock outcropping and boulder scree		
Rock Type:	Quartz and chert		
Vegetation:	*Corymbia hamersleyana* and *Terminalia canescens* low woodland over Acacia spp open shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	Recently burnt with older patches >3 years since burn		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.5`	+	
Acacia acradenia	2	5	
Acacia monticola	2.5	5	
Atalaya hemiglauca	3	+	
Cajanus cinereus	0.75	+	
Corchorus parviflorus	0.75	+	
Corymbia ?opaca	3	+	
Corymbia hamersleyana	3	2	
Crotalaria novae-hollandiae subsp. *novae-hollandiae*	0.25	+	
Eriachne mucronata	0.25	+	
Eucalyptus odontocarpa	2	+	
Dampiera candicans	0.5	+	
Gossypium australe	2	+	
Grevillea wickhamii subsp. *macrodonta*	2	5	
Hibiscus leptocladus	1.5	+	
Indigofera monophylla	0.4	+	
Polymeria ambigua	0.1	+	
Rhynchosia minima	0.25	+	
Senna notabilis	0.5	+	
Solanum horridum	0.5	+	
Tephrosia rosea var. *clementii*	0.5	+	
Terminalia canescens	3	2	
Trachymene oleracea subsp. *oleracea*	1	+	
Triodia pungens	0.5	50	
Acacia acradenia	2	5	



Quadrat 9

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	10
Survey Area:	50 x 50 m	**Date:**	13 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764955	7746154
Habitat:	Sandplains		
Soil:	Red gravelly soil		
Rock Type:	No rock exposed		
Vegetation:	*Corymbia hamersleyana* scattered trees over dense *Acacia acradenia* and *Eucalyptus odontocarpa* high shrubland / low woodland over *Triodia pungens / wiseana* hummock grassland.		
Fire Age:	> 5 7 years		
Comments:	Priority 2 species *Euphorbia clementii* recorded.		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.5	+	
Acacia acradenia	2	10	
Acacia monticola	2	+	
Bonamia media var. *villosa*	0.25	+	
Corymbia hamersleyana	4	1	
Crotalaria medicaginea subsp. *neglecta*	0.75	+	
Euphorbia clementii (P2)	0.5	+	
Eucalyptus odontocarpa	2	3	
Dampiera candicans	0.25	+	
Grevillea wickhamii subsp. *macrodonta*	3	5	
Hybanthus aurantiacus	0.5	+	
Isotropis atropurpurea	0.5	+	
Mollugo molluginea	0.25	+	
Petalostylis labicheoides	3	2	
Ptilotus astrolasius var. *astrolasius*	0.5	+	
Ptilotus calostachyus var. *calostachyus*	0.5	+	
Triodia pungens	0.5	50	
Triodia wiseana	0.5	10	

Quadrat 10

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	11
Survey Area:	50 x 50 m	**Date:**	13 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764459	7746225
Habitat:	Spinifex colluvial slopes		
Soil:	Large sized scree		
Rock Type:	Ironstone outcropping		
Vegetation:	Scattered low shrubs over *Triodia wiseana* hummock grassland		
Fire Age:	>3 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	2	+	
Acacia stellaticeps	2	1	
Corchorus sp.	0.5	+	
Petalostylis labicheoides	2	+	
Triodia wiseana	0.5	50	

Quadrat 11

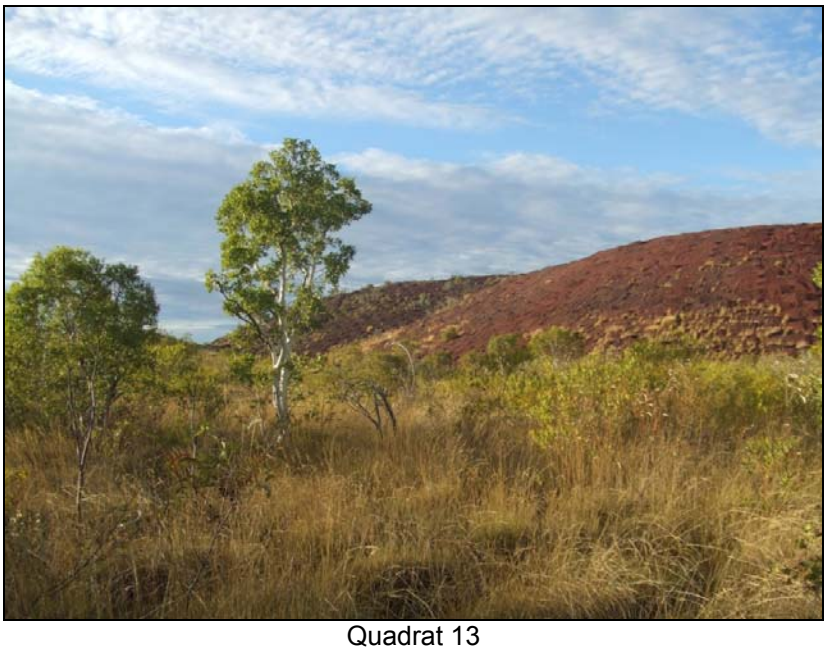
Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	12
Survey Area:	100 x 10 m	**Date:**	13 June 2008
Method:	GPS for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764176	7746154
Habitat:	Drainage line on colluvial slopes		
Soil:	Rocky alluvial silts and colluvial scree		
Rock Type:	Ironstone scree		
Vegetation:	Dense *Acacia acradenia* dense high shrubland over *Triodia ?epactia* hummock grassland.		
Fire Age:	3-5 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	2.5	+	
Acacia acradenia	2.5	60	
Acacia tumida	0.5	+	
Corchorus parviflorus	0.25	+	
Crotalaria medicaginea subsp. *neglecta*	0.5	+	
Eucalyptus odontocarpa	0.25	+	
Hybanthus aurantiacus	0.25	+	
Indigofera monophylla	0.5	80	
Isotropis atropurpurea	2.5	10	
Petalostylis labicheoides	2.5	5	
Pluchea tetranthera	2.5	2	
Ptilotus calostachyus var. *calostachyus*	0.5	+	
Streptoglossa odora	0.75	+	
Triodia ?epactia	0.5	+	

Quadrat 11

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	13
Survey Area:	50 x 50 m	**Date:**	13 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764185	7748710
Habitat:	Sandplain		
Soil:	Pindan sand and rocky layer		
Rock Type:	No exposed rock		
Vegetation:	*Corymbia flavescens* and *Corymbia hamersleyana* tall open woodland over *Acacia acradenia* open shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	> 4 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	2-3	+	
Acacia inaequilatera	3	+	
Acacia acradenia	2-3	15	
Acacia tumida var. *pilbarensis*	2-3	2	
**Cenchrus ciliaris*	0.5	+	
Corymbia flavescens	6-7	5	
Corymbia hamersleyana	5	2	
Hakea lorea subsp. *lorea*	2-3	+	
Isotropis atropurpurea	0.5	+	
Petalostylis labicheoides	2-3	+	
Triodia pungens	0.5	60	



Quadrat 13

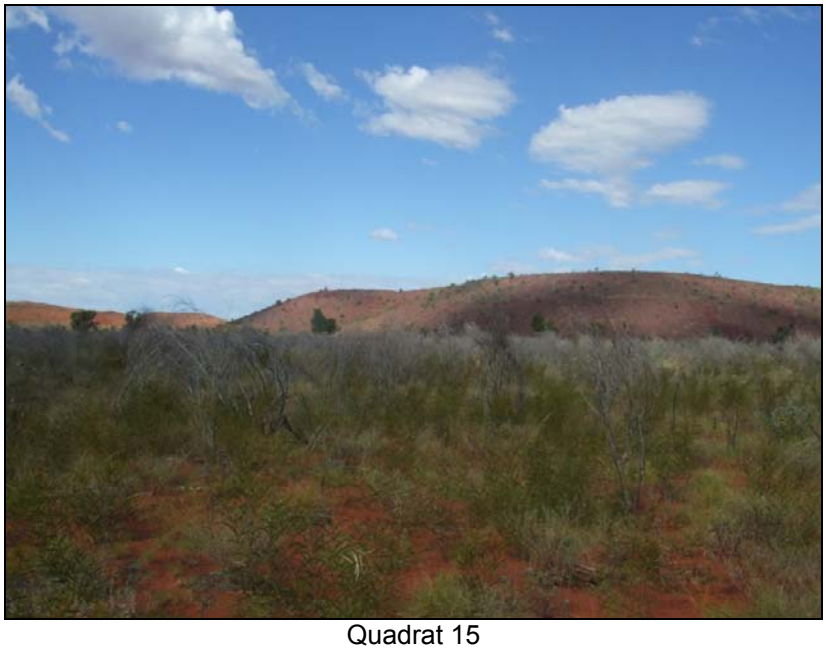
Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	14
Survey Area:	50 x 50 m	**Date:**	14 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	765188	7748713
Habitat:	Spinifex covered rocky ridges		
Soil:	Rock outcropping to surface		
Rock Type:	Chert		
Vegetation:	Emergent *Corymbia hamersleyana* over open low shrubland over T*riodia pungens* Hummock grassland.		
Fire Age:	1-2 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.25	2	
Acacia ancistrocarpa	2	+	
Acacia inaequilatera	1.5	+	
Acacia monticola	0.5	+	
Bonamia media var. *villosa*	0.5	+	
Corchorus parviflorus	0.25	2	
Corymbia hamersleyana	4	+	
Eriachne aristidea	0.25	+	
Eriachne lanata	0.25	+	
Eriachne mucronata	0.25	+	
Eriachne pulchella subsp. *dominii*	0.1	+	
Dampiera candicans	0.25	3	
Grevillea wickhamii subsp. *macrodonta*	2	3	
Hakea macrocarpa	1.5	+	
Hibiscus leptocladus	0.5	+	
Oldenlandia crouchiana	0.25	+	
Petalostylis labicheoides	2	+	
Pluchea tetranthera	0.25	+	
Pterocaulon sphaeranthoides	0.5	+	
Senna notabilis	0.25	+	
Sida cardiophylla	0.25	+	
Indigofera monophylla	0.25	1	
Tephrosia rosea var. *clementii*	0.5	+	
Tephrosia sp. Bungaroo Creek	0.5	+	
Trachymene oleracea subsp. *oleracea*	0.5	2	
Triodia pungens	0.25	40	
Triumfetta maconochieana	0.25	+	
Ptilotus obovatus var. *obovatus*	1.5	+	

Quadrat 14

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	15
Survey Area:	50 x 50 m	**Date:**	14 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	765882	7748605
Habitat:	Sandplain		
Soil:	Pindan red sand		
Rock Type:	No exposed rocks		
Vegetation:	Emergent *Corymbia zygophylla* over burnt out (*Acacia ancistrocarpa*) high shrubland over *Triodia schinzii* hummock grassland.		
Fire Age:	2 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	1	10	
Acacia colei var. *colei*	1	+	
Bonamia pannosa	0.25	2	
Cleome uncifera	0.25	+	
Corchorus elachocarpus	0.5	+	
Corymbia zygophylla	5	+	
Eragrostis eriopoda	0.5	+	
Goodenia microptera	0.5	+	
Hibiscus leptocladus	0.5	+	
Mollugo molluginea	0.25	+	
Ptilotus astrolasius var. *astrolasius*	0.5	+	
Ptilotus exaltatus var. *exaltatus*	0.25	+	
Senna notabilis	0.25	+	
Solanum ?ellipticum	0.3	+	
Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)	0.5	20	
Trianthema pilosa	0.1	+	
Tribulus hirsutus	0.25	+	
Triodia schinzii	0.25	10	



Quadrat 15

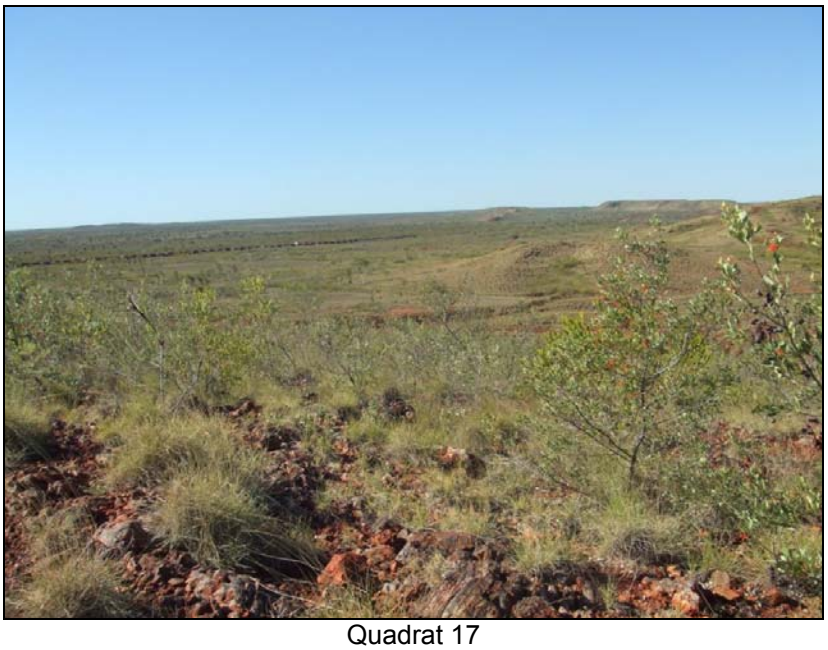
Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	16
Survey Area:	50 x 50 m	**Date:**	14 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764075	7747905
Habitat:	Rehabilitation of hardstand acting as catchment at base of waste dumps.		
Soil:	Mixed mine soils, gravelly sand		
Rock Type:	No rock exposed		
Vegetation:	*Corymbia hamersleyana* woodland over Acacia acradenia and *Eucalyptus odontocarpa* high shrubland / low woodland over *Triodia pungens* and *Cenchrus ciliaris* hummock/tussock grasslands.		
Fire Age:	>10 years		
Comments:	Dense rehabilitation due to water ponding.		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia inaequilatera	2	+	
Acacia acradenia	3	30	
Acacia monticola	2	+	
Acacia stellaticeps	1.5	+	
Acacia tumida var. *pilbarensis*	3	5	
**Cenchrus ciliaris*	1	30	
Corymbia hamersleyana	6	15	
Cucumis maderaspatanus	0.25	+	
Eucalyptus odontocarpa	4	10	
Petalostylis labicheoides	4	5	
Pterocaulon sphaeranthoides	0.75	+	
Ptilotus exaltatus var. *exaltatus*	0.5	+	
Triodia pungens	0.5	30	

Quadrat 16

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	17
Survey Area:	50 x 50 m	**Date:**	14 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	762947	7748109
Habitat:	Rocky hill top		
Soil:	Rocky scree, outcropping chert		
Rock Type:	Chert		
Vegetation:	*Grevillea wickhamii* and *Acacia acradenia* open high shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	>5 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.25	1	
Acacia inaequilatera	2	+	
Acacia acradenia	2	2	
Bonamia media var. *villosa*	0.05	+	
Corchorus parviflorus	0.1	+	
Dampiera candicans	0.5	5	
Grevillea wickhamii subsp. *macrodonta*	2	5	
Solanum dioicum	0.5	+	
Tephrosia rosea var. *clementii*	0.5	+	
Terminalia canescens	3	+	
Triodia pungens	0.25	40	
Triumfetta maconochieana	0.5	+	



Quadrat 17

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	18
Survey Area:	100 x 10 m	**Date:**	14 June 2008
Method:	GPS for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763089	7747464
Habitat:	Narrow rocky shallow valley, sleep sided, 25m wide, 10m deep		
Soil:	Creek, alluvial cobblestones		
Rock Type:	Banded iron formation and chert		
Vegetation:	*Terminalia canescens* low open woodland over *Acacia tumida* and *Acacia acradenia* open shrubland over *Triodia pungens* and *Eriachne mucronata* hummock /tussock grasslands.		
Fire Age:	> 5 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia inaequilatera	2	+	
Acacia acradenia	2	+	
Acacia tumida var. *pilbarensis*	2	2	
Atalaya hemiglauca	4	+	
Cleome viscosa	0.5	+	
Corchorus parviflorus	0.5	+	
Corymbia hamersleyana	4	+	
Crotalaria medicaginea subsp. *neglecta*			
Cucumis maderaspatanus	0.25	+	
Cymbopogon ambiguus	0.5	2	
Cyperus cunninghamii	0.25	+	
Eriachne mucronata	0.5	4	
Eriachne pulchella subsp. *dominii*			
Euphorbia coghlanii	0.25	+	
Evolvulus alsinoides var. *villosicalyx*	0.5	+	
Ficus brachypoda	1	+	
Gomphrena canescens subsp. *canescens*	0.25	+	
Grevillea wickhamii subsp. *macrodonta*	2	+	
Indigofera monophylla	0.5	+	
Leptopus decaisnei	0.2	+	
Petalostylis labicheoides	2	+	
Phyllanthus maderaspatensis	0.25	+	
Rhynchosia minima	0.5	+	
Tephrosia rosea var. *clementii*	0.5	+	
Tephrosia virens	0.5	+	
Terminalia canescens	4	10	
Trachymene oleracea subsp. *oleracea*	0.5	+	
Triodia pungens	0.5	20	

Quadrat 18

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	19
Survey Area:	50 x 50 m	**Date:**	15 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	765176	7749864
Habitat:	Scree slope on edge of small hillside grading to sandplain		
Soil:	Gravelly conglomerate white pebbles		
Rock Type:	-		
Vegetation:	Emergent *Corymbia hamersleyana* over *Grevillea wickhamii* and *Acacia stellaticeps* shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	West – burnt 1 year ago, East >5 years		
Comments:	**See original diagram**		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.25	2	
Acacia ancistrocarpa	2	+	
Acacia monticola	2	1	
Acacia stellaticeps	0.5	10	
Amphipogon sericeus	0.25	+	
Corchorus elachocarpus	0.5	+	
Corymbia hamersleyana	4	+	
Eriachne lanata	0.5	+	
Dampiera candicans	0.25	+	
Goodenia stobbsiana	0.5	+	
Grevillea wickhamii subsp. *macrodonta*	2	+	
Heliotropium pachyphyllum	0.5	2	
Isotropis atropurpurea	0.25	+	
Jacksonia aculeata	0.25	5	
Mollugo molluginea	0.25	+	
Pluchea tetranthera	0.3	+	
Sida cardiophylla	0.5	+	
Solanum diversiflorum	0.3	+	
Tephrosia monophylla	0.25	+	
Tephrosia rosea var. *clementii*	0.25	1	
Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)	0.25	+	
Tribulus hirsutus	0.25	+	
Triodia pungens	0.25	10	
Triumfetta chaetocarpa	0.5	+	

Quadrat 19

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	20
Survey Area:	50 x 50 m	**Date:**	15 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	765087	7749393
Habitat:	Sandplains		
Soil:	Deep pindan sands		
Rock Type:	No rock exposed		
Vegetation:	Emergent *Corymbia zygophylla* over *Acacia tumida* tall shrubland over *Triodia schinzii* hummock grassland with patches of *Cenchrus ciliaris.*		
Fire Age:	5-10 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Abutilon otocarpum	0.5	+	
Acacia tumida var. *pilbarensis*	3	70	
Aristida holathera var. *holathera*	0.5	+	
Bonamia pannosa	0.25	+	
Cleome viscosa	0.25	+	
**Cenchrus ciliaris*	0.75	2	
Corchorus elachocarpus	0.25	+	
Corchorus sp.	0.5	+	
Corymbia zygophylla	4-5	+	
Crotalaria ramosissima	0.5	+	
Dodonaea coriacea	0.75	+	
Grevillea nematophylla subsp. *?supraplana*	1.5	+	
Heliotropium vestitum	0.5	+	
Newcastelia cladotricha	0.25	+	
Polymeria ambigua	0.1	+	
Ptilotus arthrolasius	0.25	+	
Ptilotus polystachyus var. *arthrotricha*	1	+	
Senna notabilis	0.5	+	
Tephrosia rosea var. *glabrior* ms	0.5	+	
Trianthema pilosa	0.25	+	
Triodia schinzii	0.75	50	

Quadrat 20

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	21
Survey Area:	50 x 50 m	**Date:**	15 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763796	7746556
Habitat:	Breakaway slope south facing, mixed with spinifex hilltop vegetation		
Soil:	Rock outcrop with minimal soil.		
Rock Type:	Grey blue quartzite		
Vegetation:	*Atalaya hemiglauca* and *Terminalia* canescens low open woodland over *Acacia monticola* and *Grevillea wickhamii* shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	> 5 years		
Comments:	Breakaway slopes like islands on scree spinifex slopes – south facing		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.25	4	
Acacia acradenia	2	+	
Acacia monticola	2	2	
Amaranthus mitchellii	0.3	+	
Atalaya hemiglauca	4	2	
Bulbostylis barbata	0.25	+	
Carissa lanceolata	1.5	+	
Cleome viscosa	0.25	+	
Corchorus parviflorus	0.25	+	
Crotalaria medicaginea subsp. *neglecta*	0.25	+	
Cymbopogon ambiguus	0.5	5	
Cyperus cunninghamii	0.25	5	
Ehretia saligna var. *saligna*	3	+	
Enneapogon robustissimus	0.5	1	
Eriachne mucronata	0.25	1	
Eucalyptus odontocarpa	3	+	
Gomphrena canescens subsp. *canescens*	0.1	+	
Hybanthus aurantiacus	0.5	+	
Rhynchosia minima	0.25	+	
Senna glutinosa subsp. *glutinosa*	0.5	+	
Terminalia canescens	4	5	
Triodia pungens	0.25	20	
Trachymene oleracea subsp. *oleracea*	0.5	+	

Quadrat 21

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	22
Survey Area:	120 x 10 m	**Date:**	15 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764024	7746264
Habitat:	Drainage line in colluvial slopes		
Soil:	Pebble stones / scree		
Rock Type:	Creekbed rocks and alluvial detritus		
Vegetation:	*Acacia tumida, Petalostylis labicheoides* and *Acacia acradenia* over *Triodia pungens* hummock grassland.		
Fire Age:	> 5 years		
Comments:			

Species	Height (m)	Cover (%)	Comments
Acacia adoxa var. *adoxa*	0.25	+	
Acacia acradenia	3	40	
Acacia tumida var. *pilbarensis*	4	30	
Chrysopogon fallax	0.5	+	
Dampiera candicans	0.5	+	
Eucalyptus odontocarpa	3	10	
Hybanthus aurantiacus	1	+	
Mollugo molluginea	0.25	+	
Petalostylis labicheoides	3	20	
Ptilotus calostachyus var. *calostachyus*	0.75	+	
Sida cardiophylla	0.5	+	
Tephrosia rosea var. *clementii*	0.5	+	
Trachymene oleracea subsp. *oleracea*	0.75	+	
Triodia pungens	0.25	40	
Waltheria indica	0.5	+	

Quadrat 23

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	23
Survey Area:	50 x 50 m	**Date:**	15 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764024	7746264
Habitat:	Open spinifex grassland on rolling scree slopes		
Soil:	Pebble scree with fines		
Rock Type:	Pebble scree		
Vegetation:	Occasional emergent shrub over *Triodia pungens* hummock grassland		
Fire Age:	>3 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia inaequilatera	2	+	
Acacia acradenia	2	+	
Grevillea pyramidalis	2	+	
Grevillea wickhamii subsp. *macrodonta*	2	+	
Triodia pungens	0.25	50	

Quadrat 23

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	24
Survey Area:	150 x 10 m transect along creek	**Date:**	16 June 2008
Method:	GPS for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763302	7747053
Habitat:	Creekline in upland valley		
Soil:	Pebbles and cobblestones on silt		
Rock Type:	Alluvial cobblestones		
Vegetation:	*Acacia tumid, Grevillea wickhamii* and *Petalostylis labicheoides* over *Triodia pungens* hummock grassland.		
Fire Age:	> 5 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia acradenia	2	+	
Acacia monticola	1.5	+	
Acacia tumida var. *pilbarensis*	4	50	
Aristida holathera var. *holathera*	0.25	+	
Blumea tenella	0.25	+	
Bulbostylis barbata	0.25	+	
Cajanus cinereus	0.5	+	
Corymbia hamersleyana	2	+	
Cucumis maderaspatanus	0.25	+	
Eriachne pulchella subsp. *dominii*	0.25	+	
Dampiera candicans	0.5	+	
Grevillea wickhamii subsp. *macrodonta*	3	20	
Hybanthus aurantiacus	0.5	+	
Isotropis atropurpurea	0.5	+	
Petalostylis labicheoides	2	4	
Solanum dioicum	0.25	+	
Tephrosia monophylla	0.5	+	
Trachymene oleracea subsp. *oleracea*	0.5	+	
Triumfetta sp.	0.5	+	
Triodia pungens	0.25	30	

Quadrat 24

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	25
Survey Area:	50 x 50 m	**Date:**	16 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763439	7746832
Habitat:	Hilltop veg		
Soil:	Boney scree, rock outcropping		
Rock Type:	Ironstone outcropping		
Vegetation:	Emergent *Corymbia hamersleyana* over *Acacia acradenia* and *Grevillea wickhamii* open shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	>3 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.2	+	
Acacia acradenia	2	5	
Cassytha capillaris	0.25	+	
Corchorus parviflorus	0.5	+	
Eriachne pulchella subsp. *dominii*	0.25	+	
Grevillea wickhamii subsp. *macrodonta*	2	5	
Petalostylis labicheoides	2.0	+	
Polymeria ambigua	0.25	+	
Ptilotus calostachyus var. *calostachyus*	0.75	+	
Tephrosia rosea var. *clementii*	0.5	+	
Tephrosia virens	1.0	+	
Triodia pungens	0.25	20	
Triumfetta chaetocarpa	0.5	+	

Quadrat 25

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	26
Survey Area:	90 x 20 m along hillside	**Date:**	16 June 2008
Method:	GPS for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763172	7747312
Habitat:	Gorge hillside in shade		
Soil:	Rocky outcrop with pockets of fines		
Rock Type:	Banded iron formations and conglomerates		
Vegetation:	*Terminalia canescens* and *Atalaya hemiglauca* over *Triodia pungens* hummock grassland.		
Fire Age:	>5 years		
Comments:	Recommend move clearing zone to avoid gorge		

Species	**Height (m)**	**Cover (%)**	**Comments**
Abutilon lepidum	0.5	+	
Amaranthus mitchellii	0.25	+	
Atalaya hemiglauca	2	2	
**Cenchrus ciliaris*	0.5	+	
Cleome viscosa	0.5	+	
Cyperus cunninghamii	0.25	+	
Eriachne mucronata	0.25	+	
Euphorbia cleome	0.25	+	
Euphorbia coghlanii	0.25	+	
Evolvulus alsinoides var. *decumbens*	0.25	+	
Ficus brachypoda	1.5	+	
Nicotiana occidentalis	0.25	+	
Sida rohlenae subsp.*?*	0.25	+	
Sida subarticulata	2	+	
Terminalia canescens	4-5	15	
Triodia pungens	0.5	30	

Quadrat 26

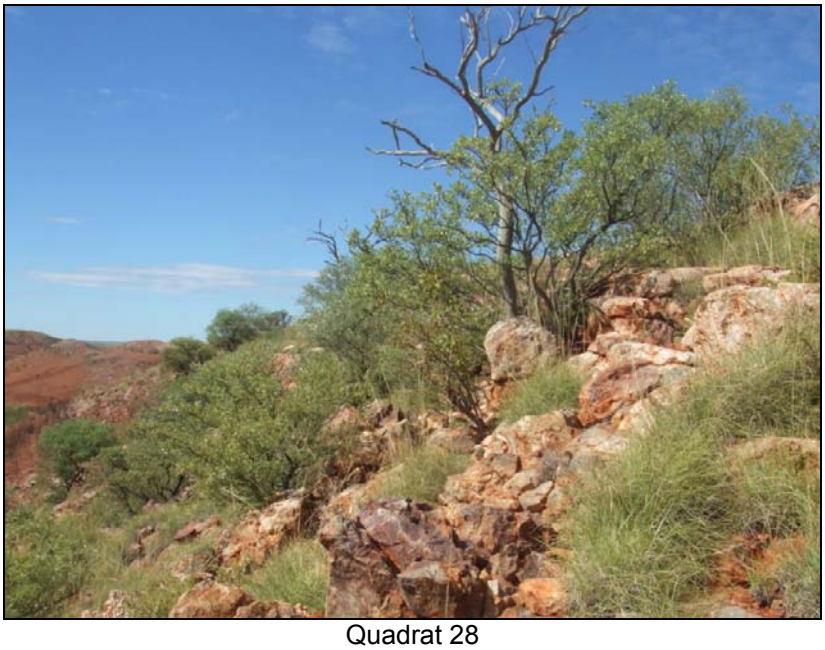
Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	27
Survey Area:	50 x 50 m	**Date:**	16 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763377	7747441
Habitat:	Ironstone chert rocky ridge		
Soil:	Minimal fines		
Rock Type:	Ironstone chert		
Vegetation:	*Grevillea wickhamii* and *Acacia acradenia* open shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	4 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.25	+	
Acacia acradenia	3	1	
Acacia monticola	2	+	
Bulbostylis barbata	0.25	+	
Corchorus parviflorus	0.5	+	
Corymbia hamersleyana	3	+	
Eriachne pulchella subsp. *dominii*	0.25	+	
Dampiera candicans	0.5	+	
Grevillea pyramidalis	2	+	
Grevillea wickhamii subsp. *macrodonta*	3	5	
Petalostylis labicheoides	1.5	+	
Ptilotus calostachyus var. *calostachyus*	0.75	+	
Tephrosia virens	0.5	+	
Triodia pungens	0.25	50	
Triumfetta chaetocarpa	0.5	1	

Quadrat 27

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	28
Survey Area:	50 x 50 m	**Date:**	16 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	765899	7747558
Habitat:	Breakaway with *Terminalia*		
Soil:	Boulders to cobblestone quartz		
Rock Type:	Quartz		
Vegetation:	*Terminalia canescens* and *Atalaya hemiglauca* low woodland over *Triodia pungens* hummock grassland.		
Fire Age:			
Comments:			

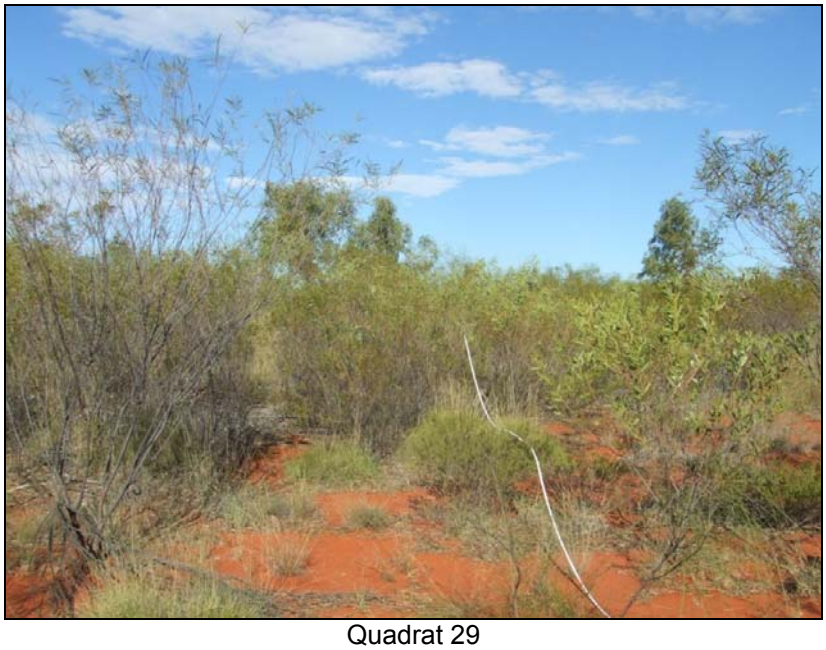
Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia colei var. *colei*	0.5	+	
Acacia acradenia	1	+	
Atalaya hemiglauca	4	2	
Cucumis maderaspatanus	0.25	+	
Cyperus difformis	0.5	+	
Evolvulus alsinoides var. *villosicalyx*	0.25	+	
Flueggea virosa subsp. *melanthesoides*	1.5	+	
Gossypium australe	1	+	
Nicotiana occidentalis	0.25	+	
Rhynchosia minima	0.25	+	
Tephrosia monophylla	0.25	+	
Terminalia canescens	4	8	
Triodia pungens	0.25	40	



Quadrat 28

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	29
Survey Area:	50 x 50 m	**Date:**	16 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763030	7749173
Habitat:	Sandplain woodland		
Soil:	Pindan red sand		
Rock Type:	No exposed rock		
Vegetation:	*E. camaldulensis* (planted in townsite), *Corymbia hamersleyana* and *Corymbia flavescens* scattered trees over *Acacia acradenia*, *Acacia tumida and Acacia ancistrocarpa* tall shrubland over *Triodia schinzii* hummock grassland.		
Fire Age:	5-10 years		
Comments:			

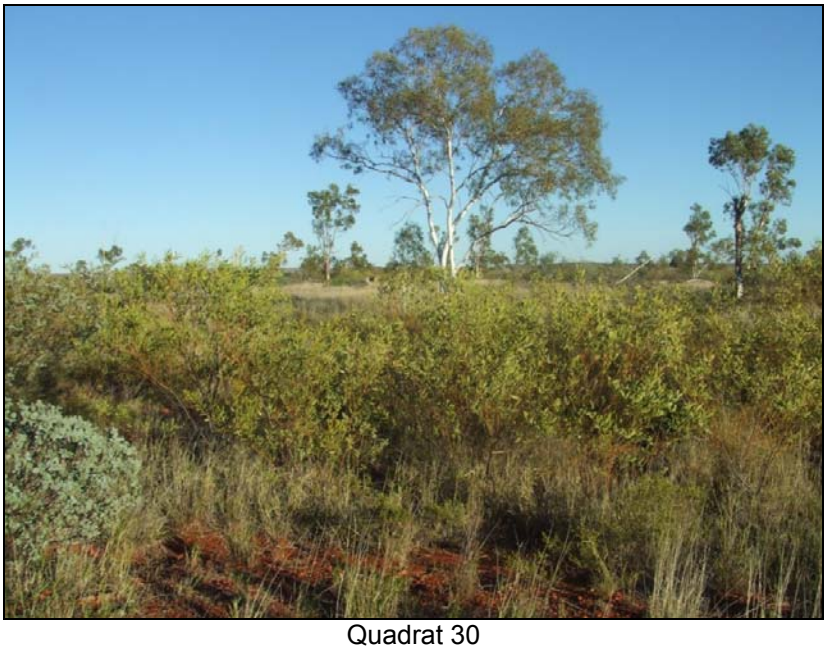
Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	3-4	60	
Acacia acradenia	2	5	
Acacia stellaticeps	0.8	+	
Acacia tumida var. *pilbarensis*	2-3	10	
Bonamia pannosa	0.5	+	
**Cenchrus ciliaris*	0.5	2	
Corchorus elachocarpus	0.3	+	
Corchorus sp.	0.2	+	
Corymbia flavescens	10	5	
Corymbia hamersleyana	5	2	
Eragrostis eriopoda	0.3	1	
Eucalyptus camaldulensis var. *obtusa*	8	+	
Jacksonia aculeata	0.5	+	
Mollugo molluginea	0.25	+	
Ptilotus astrolasius var. *astrolasius*	0.2	+	
Ptilotus calostachyus var. *calostachyus*	0.5	+	
Tephrosia rosea var. *glabrior* ms	0.5	+	
Triodia schinzii	0.5	70	



Quadrat 29

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	30
Survey Area:	120 x 10 m along creek	**Date:**	16 June 2008
Method:	GPS used for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	762990	7748711
Habitat:	Goldsworthy townsite rehabilitation		
Soil:	Loam with pebbles		
Rock Type:	No exposed rock		
Vegetation:	*Acacia ancistrocarpa, Acacia bivenosa*, *Acacia tumida* and Acacia *acradenia* co-dominant shrubland over *Triodia pungens and Triodia wiseana* hummock grassland with *Cenchrus ciliaris* tussock grassland.		
Fire Age:	>5 years		
Comments:	Rehabilitation – with Buffel Grass (*Cenchrus ciliaris)* infestation.		

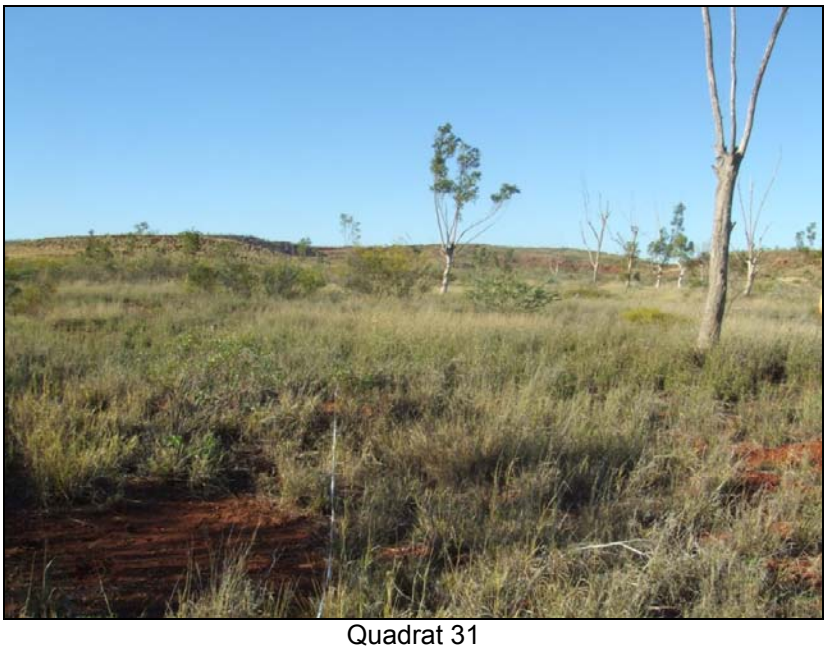
Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	2	5	
Acacia bivenosa	2	5	
Acacia acradenia	3	5	
Acacia stellaticeps	1.0	+	
Acacia tumida var. *pilbarensis*	3	3	
**Cenchrus ciliaris*	0.5	10	
Corchorus parviflorus	0.5	+	
Senna artemisioides subsp. *helmsii*	0.5	+	
Senna artemisioides subsp. *oligophylla*	0.5	+	
Senna glutinosa subsp. *pruinosa*	0.5	+	
Sida cardiophylla	0.25	+	
Triodia pungens	0.25	5	
Triodia wiseana	0.25	5	
**Vachellia farnesiana*	1.5	+	



Quadrat 30

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	31
Survey Area:	140 x 15 m along creek	**Date:**	17 June 2008
Method:	GPS for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763133	7748655
Habitat:	Goldsworthy townsite rehabilitation		
Soil:	Pebbly red sandy loam		
Rock Type:	No exposed rock		
Vegetation:	Emergent and moribund *Eucalyptus camaldulensis* var. *obtusa* with *Cenchrus ciliaris* closed tussock grassland.		
Fire Age:	5-10 years		
Comments:	Rehabilitation – with massive Buffel Grass (*Cenchrus ciliaris)* infestation.		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia bivenosa	2	+	
Acacia acradenia	2	+	
**Cenchrus ciliaris*	0.25	40	
Corchorus elachocarpus	0.5	+	
Corchorus parviflorus	0.5	+	
Eucalyptus camaldulensis var. *obtusa*	6-10	+	
Senna artemisioides subsp. *oligophylla*	2	+	
Senna notabilis	0.5	+	



Quadrat 31

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	32
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	762579	7748599
Habitat:	Wide creek bed and embankments.		
Soil:	Creek bed alluvium, cobbles, pebbles / gravelly soils on embankment.		
Rock Type:	No exposed rock.		
Vegetation:	Vegetation described on embankment: *Corymbia hamersleyana* and *Terminalia canescens* over Acacia *bivenosa* and *Petalostylis labicheoides* and *Acacia tumida* tall shrubland over *Triodia pungens* hummock grassland and Cenchrus ciliaris tussock grassland.		
Fire Age:			
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia bivenosa	2	2	
Acacia acradenia	2	+	
Acacia pyrifolia var. *pyrifolia*	2	4	
Acacia tumida var. *pilbarensis*	0.5	2	
Atalaya hemiglauca	4	+	
**Cenchrus ciliaris*	0.75	35	
Cleome viscosa	0.25	+	
Corchorus parviflorus	0.5	+	
Corymbia hamersleyana	4	5	
Cyperus vaginatus	0.75	+	
Eriachne mucronata	0.5	+	
Grevillea wickhamii subsp. *macrodonta*	1.5	+	
Hybanthus aurantiacus	0.5	+	
Ipomoea muelleri	0.1	+	
Petalostylis labicheoides	2	+	
Pluchea rubelliflora	0.25	+	
Pluchea tetranthera	0.5	+	
Stemodia viscosa	0.5	+	
**Tamarix aphylla*	3	+	Declared plant
Terminalia canescens	4	2	
Triodia pungens	0.75	35	
Waltheria indica	0.5	+	

Quadrat 32

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	33
Survey Area:	100 x 15 m along creek	**Date:**	17 June 2008
Method:	GPS used for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	762579	7748599
Habitat:	Creekline in scree slopes, incised to 3m		
Soil:	Assorted pebbles & cobblestones & colluvium		
Rock Type:	No exposed rock		
Vegetation:	*Acacia acradenia* and *Grevillea wickhamii* dense tall shrubland over *Triodia ?epactia* hummock grassland.		
Fire Age:	>5 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.25	+	
Acacia acradenia	2	25	
Acacia monticola	2	+	
Aristida holathera var. *holathera*	0.25	+	
Corchorus parviflorus	0.25	+	
Corymbia hamersleyana	3	+	
Dampiera candicans	0.5	+	
Grevillea pyramidalis	2	+	
Grevillea wickhamii subsp. *macrodonta*	2	25	
Goodenia stobbsiana	0.5	+	
Leptopus decaisnei	0.5	+	
Petalostylis labicheoides	2	2	
Triodia ?epactia	0.5	40	

Quadrat 33

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	34
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	762839	7748368
Habitat:	Open spinifex grassland on rolling scree slopes		
Soil:	Pebble scree with fines		
Rock Type:	Pebble scree		
Vegetation:	Occasional emergent *Grevillea wickhamii* over *Triodia pungens* hummock grassland		
Fire Age:	> 3 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	2.5	+	
Acacia inaequilatera	3	2	
Acacia acradenia	2.5	1	
Corchorus parviflorus	0.25	+	
Grevillea wickhamii subsp. *macrodonta*	2.5	2	
Ptilotus calostachyus var. *calostachyus*	0.5	+	
Salsola australis	0.5	+	
Solanum dioicum	0.5	+	
Triodia pungens	0.5	45	

Quadrat 34

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	35
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763365	7748641
Habitat:	Goldsworthy townsite rehabilitation. Old sporting oval.		
Soil:	Sand		
Rock Type:	No exposed rock.		
Vegetation:	Emergent *Vachellia farnesiana* 2.5m / 1% Buffel Grass 0.5m / 70% grassed		
Fire Age:			
Comments:	Buffel Grass (Cenchrus ciliaris) monoculture		

Species	**Height (m)**	**Cover (%)**	**Comments**
**Cenchrus ciliaris*	0.5	70	
Petalostylis labicheoides	1.0	+	
Senna artemisioides subsp. *oligophylla*	0.5	+	
Senna glutinosa subsp. *pruinosa*	0.5	+	
Senna notabilis	0.5	+	
**Vachellia farnesiana*	2.5	1	

Quadrat 35

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	36
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763720	7748823
Habitat:	Rehabilitated infrastructure area.		
Soil:	Rehabilitated loamy pebble scree		
Rock Type:	No exposed rock.		
Vegetation:	*Acacia acradenia* and *Acacia tumida* dense shrubland over *Triodia angusta* hummock grassland.		
Fire Age:	>10 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	2	+	
Acacia acradenia	3	50	
Acacia tumida var. *pilbarensis*	3.5	10	
**Cenchrus ciliaris*	0.5	10	
Triodia angusta	1.5	80	
Triodia pungens	0.5	+	

Quadrat 36

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	37
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	762522	7748805
Habitat:	Rehabilitated infrastructure area.		
Soil:	Rehabilitated loamy pebble scree		
Rock Type:	No exposed rock.		
Vegetation:	*Corymbia hamersleyana* scattered trees over *Acacia acradenia* and *Acacia tumida* dense shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	> 5 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	3	5	
Acacia acradenia	3	50	
Acacia stellaticeps	1	1	
Acacia tumida var. *pilbarensis*	3	5	
**Cenchrus ciliaris*	0.25	10	
Corymbia hamersleyana	6	+	
Eragrostis eriopoda	0.25	+	
Eucalyptus camaldulensis var. *obtusa*	12	1	
Pluchea tetranthera	0.5	+	
Senna artemisioides subsp. *helmsii*	0.5	+	
Senna artemisioides subsp. *oligophylla*	0.5	+	
Sida arenicola	1.2	+	
Sida cardiophylla	0.25	+	
Triodia pungens	0.5	50	

Quadrat 37

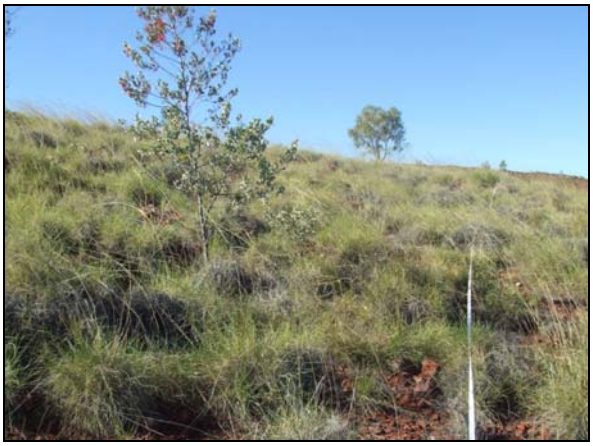
Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	38
Survey Area:	100 x 10 m along creekbed	**Date:**	17 June 2008
Method:	GPS used for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763837	7748476
Habitat:	Drainage line on rocky hillside		
Soil:	Creek bed and rocky substrate, pebbles		
Rock Type:	Ironstone outcropping		
Vegetation:	Emergent *Corymbia hamersleyana* over *Grevillea wickhamii, Acacia monticola* and *Acacia acradenia* co-dominant tall closed shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	5 to 10 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia acradenia	3	50	
Acacia monticola	4	15	
Corymbia hamersleyana	6	2	
Grevillea wickhamii subsp. *macrodonta*	4	15	
Hibiscus coatesii	1	+	
Petalostylis labicheoides	3	2	
Triodia pungens	0.5	40	

Quadrat 38

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	39
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764707	7747023
Habitat:	Hilltop & slopes		
Soil:	Ironstone scree, pebbles & fines		
Rock Type:	Ironstone outcrop		
Vegetation:	*Eucalyptus odontocarpa* and *Corymbia hamersleyana* scattered trees over *Acacia acradenia* very open shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	>10 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var. *adoxa*	0.25	+	
Acacia colei var. *colei*	2	+	
Acacia inaequilatera	1.5	+	
Acacia acradenia	3	2	
Acacia monticola	2.0	+	
Corchorus parviflorus	0.25	+	
Corymbia hamersleyana	4	+	
Cucumis maderaspatanus	0.25	+	
Cymbopogon obtectus	0.5	1	
Cynanchum floribundum	0.5	+	
Eucalyptus odontocarpa	2	5	
Euphorbia boophthona	0.25	+	
Grevillea pyramidalis	1.5	+	
Grevillea wickhamii subsp. *macrodonta*	2	+	
Pterocaulon serrulatum	0.75	+	
Ptilotus calostachyus var. *calostachyus*	0.75	+	
Ptilotus exaltatus var. *exaltatus*	0.25	+	
Ptilotus obovatus var. *obovatus*	0.5	+	
Senna glutinosa subsp. *glutinosa*	0.75	+	
Senna notabilis	0.25	+	
Sida pilbarensis	0.5	+	
Solanum ?ellipticum	0.5	+	
Tephrosia rosea var. *clementii*	0.25	+	
Trachymene oleracea subsp. *oleracea*	0.5	+	
Triodia pungens	0.5	50	
Triumfetta maconochieana	0.25	+	



Quadrat 39

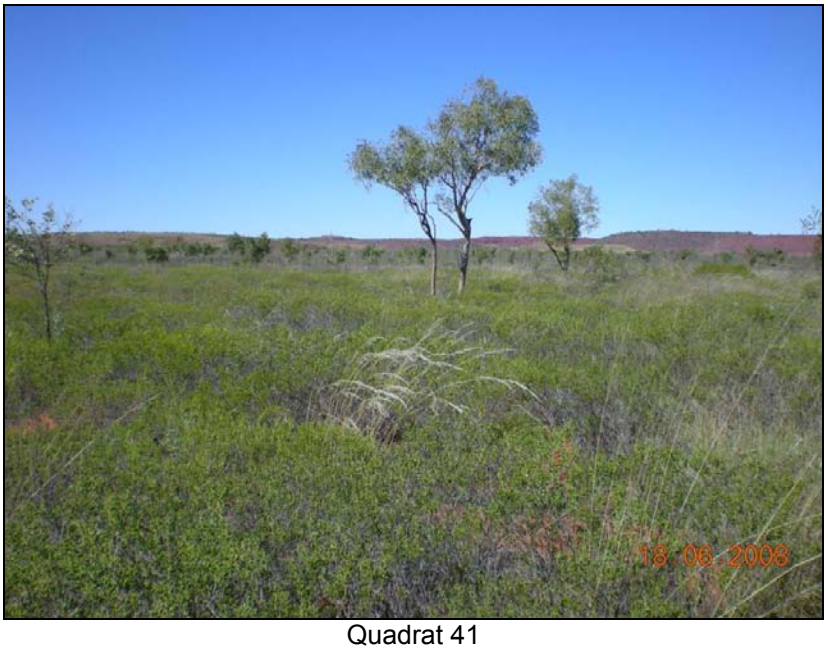
Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	40
Survey Area:	50 x 50 m	**Date:**	18 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	762293	7749268
Habitat:	Sand plain burnt		
Soil:	Pindan sand		
Rock Type:	No exposed rock		
Vegetation:	*Corymbia hamersleyana* over mixed regrowth seedlings of *Acacia acradenia*, *Eragrostis eriopoda, Triodia schinzii* and *Corchorus elachocarpus*		
Fire Age:	> 1 year		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	0.25	1	
Acacia acradenia	0.5	7	
Aristida holathera var. *holathera*	0.25	1	
Bonamia pannosa	0.25	2	
**Cenchrus ciliaris*	0.25	2	
Codonocarpus cotinifolius	0.25	+	
Corchorus elachocarpus	0.25	2	
Corchorus sp.	0.25	2	
Corymbia hamersleyana	6	5	
Eragrostis eriopoda	0.25	15	
Goodenia microptera	0.25	+	
Hibiscus leptocladus	0.25	+	
Hybanthus aurantiacus	0.25	+	
Isotropis atropurpurea	0.25	+	
Jacksonia aculeata	0.25	3	
Ptilotus calostachyus var. *calostachyus*	0.5	+	
Senna notabilis	0.25	+	
Solanum diversiflorum	0.25	1	
Trianthema pilosa	0.25	+	
Tribulus hirsutus	0.25	+	
Triodia pungens	0.5	15	
Triodia schinzii	0.25	1	

Quadrat 40

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	41
Survey Area:	50 x 50 m	**Date:**	18 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764223	7749804
Habitat:	Pindan sandplain with *Acacia stellaticeps* scrub		
Soil:	Pindan red sand		
Rock Type:	No rock exposed.		
Vegetation:	Emergent *Corymbia hamersleyana* over scattered *Grevillea wickhamii* over *Acacia stellaticeps* closed heath over *Triodia schinzii* hummock grassland		
Fire Age:	>5 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	2	+	
Acacia stellaticeps	1	80	
Acacia tumida var. *pilbarensis*	1.5	+	
Corchorus elachocarpus	0.5	+	
Corymbia hamersleyana	6	5	
Cyperus blakeanus	0.3	+	
Eragrostis eriopoda	0.5	+	
Dampiera candicans	0.25	+	
Grevillea wickhamii subsp. *macrodonta*	2-3	1	
Hakea macrocarpa	1.5	+	
Hibiscus leptocladus	0.5	+	
Hybanthus aurantiacus	0.5	+	
Mollugo molluginea	0.25	+	
Pluchea ferdinandi- muelleri	0.2	+	
Pluchea tetranthera	0.5	2	
Pterocaulon sphaeranthoides	0.5	+	
Triodia pungens	0.5	+	
Triodia schinzii	0.5	50	



Quadrat 41

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	42
Survey Area:	50 x 50 m	**Date:**	18 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764145	7749554
Habitat:	Sandplain		
Soil:	Pindan red sand		
Rock Type:	No rock exposed		
Vegetation:	*Corymbia zygophylla* open woodland over *Acacia tumida, Acacia stellaticeps* and other mixed regowth species.		
Fire Age:	Burnt recently < 1 year		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Abutilon otocarpum	0.25	+	
Acacia ancistrocarpa	0.25	1	
Acacia stellaticeps	0.5	10	
Acacia tumida var. *pilbarensis*	0.25	3	
Aristida holathera var. *holathera*	0.25	+	
Bonamia pannosa	0.25	+	
Bonamia rosea	0.25	+	
Calytrix carinata	0.5	+	
Cleome uncifera	0.25	+	
Corchorus elachocarpus	0.25	+	
Corchorus parviflorus	0.5	+	
Corchorus sp.	0.25	1	
Corymbia hamersleyana	6	1	
Corymbia zygophylla	5	5	
Eragrostis eriopoda	0.5	5	
Dampiera candicans	0.25	+	
Grevillea eriostachya	2	1	
Hakea macrocarpa	0.5	+	
Halgania solanacea var. *solanacea*	0.25	+	
Heliotropium vestitum	0.25	+	
Hibiscus leptocladus	0.25	+	
Jacksonia aculeata	0.25	1	
Mollugo molluginea	0.25	+	
Polymeria ambigua	0.25	+	
Ptilotus arthrolasius	0.25	+	
Ptilotus astrolasius var. *astrolasius*	0.5	+	
Ptilotus calostachyus var. *calostachyus*	0.5	+	
Ptilotus polystachyus var. *arthrotricha*	0.25	+	
Senna notabilis	0.25	+	
Solanum diversiflorum	0.25	+	
Tephrosia monophylla	0.25	+	
Tephrosia rosea var. *glabrior* ms	0.25	1	
Trianthema pilosa	0.25	+	
Tribulus hirsutus	0.25	+	
Triodia schinzii	0.25	1	

Quadrat 42

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	43
Survey Area:	50 x 10 m	**Date:**	14 June 2008
Method:	GPS used for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763291	7747691
Habitat:	Creekline in upland valley		
Soil:	Pebbles and colluvial rocks in creekbed		
Rock Type:	Colluvial hillsides		
Vegetation:	Mixed *Eucalyptus odontocarpa* low woodland and *Acacia acradenia* and *Acacia monticola* high shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	> 5 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia acradenia	3	30	
Acacia monticola	3	20	
Cymbopogon ambiguus	0.5	+	
Eucalyptus odontocarpa	3	10	
Grevillea wickhamii subsp. *macrodonta*	3	5	
Petalostylis labicheoides	3	5	
Sida subarticulata	0.5	+	
Triodia pungens	0.5	30	

Quadrat 43

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	44
Survey Area:	50 x 10 m	**Date:**	17 June 2008
Method:	GPS used for distance measurements		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763754	7748347
Habitat:	Drainage line on rocky hillside		
Soil:	Creek bed, rock outcropping, pebbles		
Rock Type:	Chert		
Vegetation:	Emergent *Corymbia hamersleyana* over *Acacia acradenia* high shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	5 to 10 years		
Comments:			

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia acradenia	2	70	
Acacia monticola	4	15	
Corymbia hamersleyana	3	3	
Grevillea wickhamii subsp. *macrodonta*	2	+	
Hibiscus coatesii	1	+	
Petalostylis labicheoides	2	+	
Triodia pungens	0.5	50	

Quadrat 44

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	45
Survey Area:	60 x 40 m	**Date:**	17 June 2008
Method:	GPS used for site location		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764091	7748700
Habitat:	Disturbed ground, old borrow pit.		
Soil:	Borrow pit gravel		
Rock Type:	Laterite		
Vegetation:	*Corymbia flavescens* open woodland over *Acacia tumida* and *Acacia ancistrocarpa* open shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	> 5 years		
Comments:	Heavily disturbed ground.		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	3	10	
Acacia acradenia	2	2	
Acacia tumida var. *pilbarensis*	3	10	
Aristida holathera var. *holathera*	1	+	
**Cenchrus ciliaris*	0.5	5	
Corchorus elachocarpus	0.5	+	
Corchorus parviflorus	0.5	+	
Corymbia flavescens	6	2	
Cucumis maderaspatanus	0.25	+	
Gomphrena canescens subsp. *canescens*	0.25	+	
Hibiscus sturtii var. *campylochlamys*	1	+	
Isotropis atropurpurea	0.5	+	
Paspalidium basicladum	0.75	+	
Pterocaulon serrulatum	0.75	+	
Pterocaulon sphaeranthoides	0.5	+	
Ptilotus calostachyus var. *calostachyus*	0.75	+	
Ptilotus obovatus var. *obovatus*	1	1	
Rhynchosia minima	0.25	+	
Senna glutinosa subsp. *pruinosa*	0.75	1	
Senna notabilis	0.5	+	
Triodia pungens	0.5	10	

Quadrat 45

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	46
Survey Area:	60 x 40 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764403	7748614
Habitat:	Very old borrow pit, extensive regrowth.		
Soil:	Borrow pit gravel		
Rock Type:	Laterite		
Vegetation:	*Corymbia flavescens* open woodland over *Acacia tumida* and *Acacia ancistrocarpa* open shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	> 5 years		
Comments:	Heavily disturbed ground.		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia adoxa var *adoxa*	0.25	+	
Acacia acradenia	5	15	
Acacia tumida var *pilbarensis*	3	60	
Corymbia flavescens	6	1	
Corymbia hamersleyana	5	10	
Grevillea wickhamii subsp *macrodonta*	3	+	
Senna glutinosa subsp *pruinosa*	0.75	+	
Sida cardiophylla	0.5	+	
Solanum diversiflorum	0.75	+	
Tephrosia rosea var *clementii*	0.5	+	
Triodia pungens	0.5	50	

Quadrat 46

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	47
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764409	7748621
Habitat:	Mine rehabilitation		
Soil:	Mine waste material		
Rock Type:	Mine waste		
Vegetation:	*Acacia tumida* mixed open shrubland over *Triodia angusta* open hummock grassland.		
Fire Age:	> 5 years		
Comments:	Heavily disturbed ground.		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia bivenosa	2	1	
Acacia colei var *colei*	3	+	
Acacia acradenia	3	+	
Acacia stellaticeps	1	+	
Acacia tumida var *pilbarensis*	3	5	
**Aerva javanica*	0.5	+	
**Cenchrus ciliaris*	1	2	
Cleome viscosa	0.5	+	
Corchorus parviflorus	0.5	+	
Corchorus laniflorus	0.5	+	
Dysphania rhadinostachya subsp *rhadinostachya*	0.25	+	
Cymbopogon ambiguus	1	5	
Gomphrena affinis subsp *pilbarensis*	0.1	+	
Gomphrena canescens subsp *canescens*	0.1	+	
Cucumis maderaspatanus	0.25	+	
Petalostylis labicheoides	3	+	
Ptilotus exaltatus var *exaltatus*	0.5	+	
Salsola australis	1	1	
Senna artemisioides subsp *oligophylla*	1	+	
Senna notabilis	0.5	+	
Trianthema triquetra	0.1	+	
Triodia angusta	1	40	

Quadrat 47

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	48
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763947	7747279
Habitat:	Mine rehabilitation		
Soil:	Mine waste material		
Rock Type:	Mine waste		
Vegetation:	Scattered *Corymbia hamersleyana* over *Grevillea wickhamii* tall shrubland over *Triodia pungens* hummock grassland.		
Fire Age:	> 5 years		
Comments:	Heavily disturbed ground.		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia acradenia	2	+	
Acacia tumida var *pilbarensis*	3	+	
**Aerva javanica*	1	1	
Boerhavia gardneri	0.25	+	
**Cenchrus ciliaris*	1	1	
Cleome viscosa	0.5	+	
Corchorus parviflorus	0.75	+	
Corymbia hamersleyana	4	+	
Cymbopogon obtectus	1	5	
Gomphrena affinis subsp *pilbarensis*	0.25	+	
Gossypium robinsonii	2	+	
Grevillea wickhamii subsp *macrodonta*	4	40	
Cucumis maderaspatanus	0.25	+	
Pterocaulon sphaeranthoides	0.5	+	
Ptilotus exaltatus var *exaltatus*	0.5	1	
Salsola australis	1	+	
Senna artemisioides subsp *oligophylla*	1	+	
Sida echinocarpa	1.5	+	
Triodia pungens	1	5	
Triumfetta chaetocarpa	0.75	+	

Quadrat 47

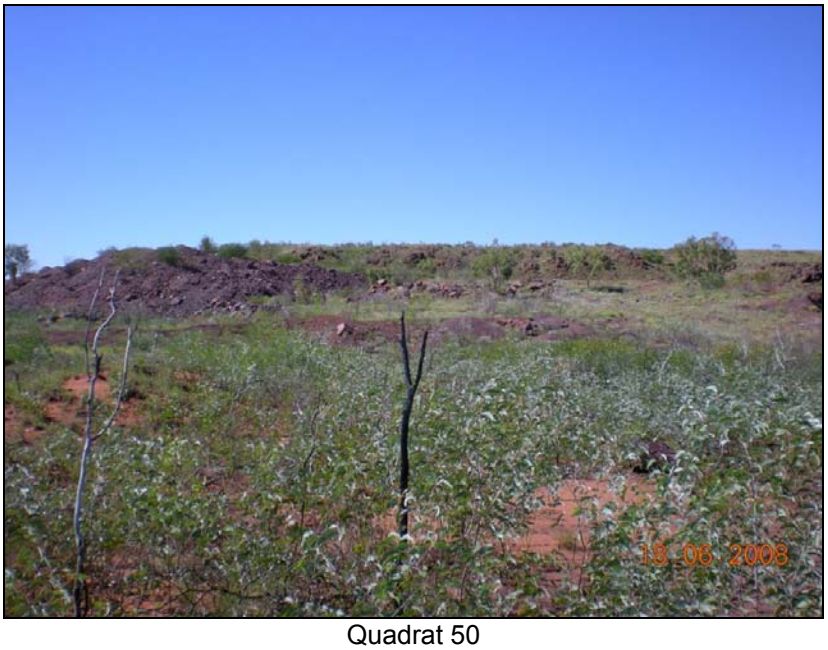
Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	49
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	763947	7747279
Habitat:	Mine rehabilitation – old borrow pit		
Soil:	Laterite		
Rock Type:	Laterite		
Vegetation:	*Acacia ancistrocarpa* and *Acacia acradenia* tall open shrubland over *Triodia pungens* open hummock grassland.		
Fire Age:	> 5 years		
Comments:	Heavily disturbed ground.		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia ancistrocarpa	3	10	
Acacia acradenia	3	10	
Acacia inaequilatera	3	2	
Acacia maitlandii	3	+	
Grevillea wickhamii subsp *macrodonta*	1.5	2	
Petalostylis labicheoides	1.5	1	
Triodia pungens	0.5	30	

Quadrat 49

Vegetation Survey:	Goldsworthy Mine Area	**Quadrat:**	50
Survey Area:	50 x 50 m	**Date:**	17 June 2008
Method:	50m tape measure for quadrat corners		
GPS location:	Centre of quadrat	Easting	Northing
	Datum - GDA1994 Zone 50	764637	7748806
Habitat:	Mine rehabilitation – laydown area		
Soil:	Hardstand clay		
Rock Type:	No rock exposed		
Vegetation:	*Acacia tumida* low open shrubland over mixed regrowth species.		
Fire Age:	< 1 year		
Comments:	Heavily disturbed ground.		

Species	**Height (m)**	**Cover (%)**	**Comments**
Acacia tumida var *pilbarensis*	2	70	
Aristida inaequiglumis	0.5	+	
Corchorus elachocarpus	0.5	+	
Corchorus parviflorus	0.5	+	
Eriachne aristidea	0.5	+	
Pterocaulon sphaeranthoides	0.5	+	
Senna notabilis	0.5	+	
Sesbania cannabina	2	+	
Sida pilbarensis	0.5	+	
Solanum ?ellipticum	0.5	+	
Solanum horridum	0.5	+	
Tephrosia rosea var *clementii*	0.5	+	
Triodia pungens	0.5	+	



Quadrat 50