

MINJAR GOLD BIOLOGICAL SURVEY



MINJAR GOLD MINE EXPANSION FLORA AND VEGETATION ASSESSMENT

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MIN11011 – Minjar Gold Biological Assessment Survey

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EXECUTIVE SUMMARY

Minjar Gold Pty Ltd (MGPL) has a combination of mining and exploration tenements stretching over 48 km along a north south corridor approximately 70 km south south east of Yalgoo township. Prior to MGPL, the tenements were owned and mined by Gindalbie Gold NL, but have been in care and maintenance for a number of years. As a consequence, the MGPL tenements are already partially cleared, with many existing pits, and a high level of exploration clearing and drilling has occurred. In planning for future mining, MGPL have undertaken a biological survey concerning six current tenements, in preparation for the vegetation clearing necessary for a return to mine production.

MGPL is situated in the central Talling district of the Yalgoo bioregion, generally considered as an inter-zone between the vegetation of the south western temperate regions and the arid and semi arid communities of the north and inland. Hosting a diverse and highly endemic flora, 23 % of the Yalgoo bioregion is protected in conservation reserves. In the central Talling district there are no current reserves, however former pastoral leases have been purchased by the Department of Environment and Conservation with the intention of future inclusion in the conservation estate. These are centred on banded ironstone formations. MGPL tenements do not cover any major banded ironstone formations, but has them to the west, east and south east from 25 to 75 km away.

As commercial use of the area was historically confined to rangeland grazing of sheep, over 95 % of pre-European native vegetation cover persists in very good condition. The major disturbance and threat to biological values in the region is mining. Existing tenements overlap landforms that have subsequently been found to contain flora of high conservation value and existing reserves do not yet provide the level of protection warranted.

This report details the biological assessment survey, designed to fulfil the criteria for a Level 2 'detailed' survey according to EPA Guidance Statement No. 51 on terrestrial flora and vegetation surveys for environmental impact assessment (EPA, 2004). Present and past field surveys do not find MGPL to host any major banded ironstone formations, any threatened or priority ecosystems or any flora of critically endangered, endangered, or threatened status. Prior surveys have identified Priority 1 status flora in restricted areas, however current field survey efforts failed to locate these populations. The current field survey identified one species of Priority 2 flora and five species of Priority 3 flora.

Recommendations on the management of Priority flora and potential suitable habitat for conservation value flora are made under the guidance of Department of Environment and Conservation reports (DEC 2007). A small area of banded ironstone outcropping was identified and is considered as potential habitat for endemic flora of high conservation value of the nearby banded ironstone formations. This area is to be conserved with a 50 m buffer. All individuals of the Priority 2 species and the associated habitat are to be retained with a 50 m buffer. Populations of Priority 3 flora are to be conserved where possible, particularly where large numbers of individuals are present.

CONTENTS

1. Introduction 1

 1.1 Introduction and Scope of Work..... 1

 1.2 Background and Supporting Information 3

2. Methods 4

 2.1 Contributing Authors 4

 2.2 Survey Conditions 4

 2.3 Survey Methodology..... 5

 2.3.1 Flora 5

 2.3.2 Flora and Vegetation Survey 5

 2.3.2.1 *Desktop Assessment*..... 5

 2.3.2.2 *Fieldwork*..... 9

3. Results 11

 3.1 Desktop Assessment 11

 3.1.1 Regional Representation 11

 3.1.1.1 *IBRA Bioregions* 11

 3.1.1.2 *Rangeland Land System Mapping*..... 11

 3.2 Desktop Interpretation 12

 3.2.1 Threatened Ecological Communities 12

 3.2.2 Priority Ecological Communities 12

 3.2.3 Protected Matters Search Tool 13

 3.2.4 Threatened and Priority Flora 13

 3.3 Field Survey Assessment and Interpretation 18

 3.3.1 Flora 18

 3.3.1.1 *Plants of Conservation Significance* 18

 3.3.1.1.1 *Priority Flora*..... 18

 3.3.1.2 *Weeds* 21

 3.3.2 Vegetation..... 22

3.3.2.1 Vegetation Units (Community Types)	22
3.3.2.2 Vegetation Condition	28
4. Discussion	29
4.1 Threatened and priority plants	29
4.2 Threatened or Priority Ecological Communities	30
4.3 Declared Plants	30
4.4 Vegetation Condition	30
4.5 Survey limitations	31
4.6 recommendations.....	31
5. References	33
Appendix 1 – Definitions of Conservation Codes for Flora	37
Appendix 2 – DEC Threatened (declared rare) database Search Results	40
Appendix 3 – EPBC Matters of national environmental significance	43
Appendix 4 – Threatened & priority ecological communities database search	51
Appendix 5: GPS locations of confirmed priority flora	58
Appendix 6 – Vegetation community maps (Figures 4.1-4.5)	63
Appendix 7 – Vegetation condition maps (Figures 5.1-5.5)	69

FIGURES

Figure 1: General location map and location of tenements	2
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TABLES

Table 1: Average Temperature and Rainfall Data for Yalgoo (Station 7091 Bureau of Meteorology)	4
Table 2: Flora and Vegetation reports conducted at Minjar Gold Pty Ltd tenements prior to 2011.	8
Table 3: Vegetation Condition Rating Scale (adapted from Keighery 1994)	10
Table 4: Threatened and Priority Flora previously recorded in or near MGPL tenements	15
Table 5. Population locations and sizes of <i>Acacia diallaga</i> Maslin & Buscumb (P2)	19
Table 6. Population locations and sizes of <i>Mircomyrtus trudgenii</i> Rye (P3)	19
Table 7. Population locations and sizes of <i>Drummondita fulva</i> A.S. Markey & R.A. Meissn (P3)	20
Table 8. Population locations and sizes of <i>Grevillea globosa</i> C.A. Gardner (P3)	20
Table 9. Population locations and sizes of <i>Grevillea subtiliflora</i> McGill (P3)	21
Table 10. Population locations and sizes of <i>Grevillea scabrida</i> C.A. Gardner (P3)	21
Table 11. Weed species recorded at MGPL tenements in previous surveys.	22

1. INTRODUCTION

1.1 INTRODUCTION AND SCOPE OF WORK

APM was engaged by Minjar Gold Proprietary Limited (MGPL) in November 2011 to undertake the biological assessment surveys and environmental approvals for the Minjar Gold pit expansions. A general location map is provided in Figure 1. The results of the field survey undertaken in November 2011 are reported herein (the project).

An extensive field survey was carried out within six mining tenements, specifically, the target areas over which the surveys were focussed were:

- Austin M59/732 ; M59/457
- Windinne Well M59/219; M59/421-I
- Silverstone M59/421-I ; M59/458-I; M59/497
- Bugeye M59/420; M59/497
- Highland Chief M59/425

The field assessment was designed with reference to Guidance Statement 51 (EPA 2004) and Environmental Protection Authority (EPA) Position Statement No 3. (EPA 2002) and included:

- a desk-top investigation of the project area, including a review of on-line databases and reports available in the public domain;
- a review of matters of national environmental significance that are protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* that potentially occur within the vicinity of the project area;
- a discussion of the likely occurrence of conservation significant species listed under the *Wildlife Conservation Act 1950* in the project area;
- a review of the currently listed Priority Ecological and Threatened Ecological Communities of the Murchison region to determine if these communities are present in the project area; and
- identification of any environmental issues relating to flora and vegetation that may require the current proposed mine expansion impact footprint to be altered.

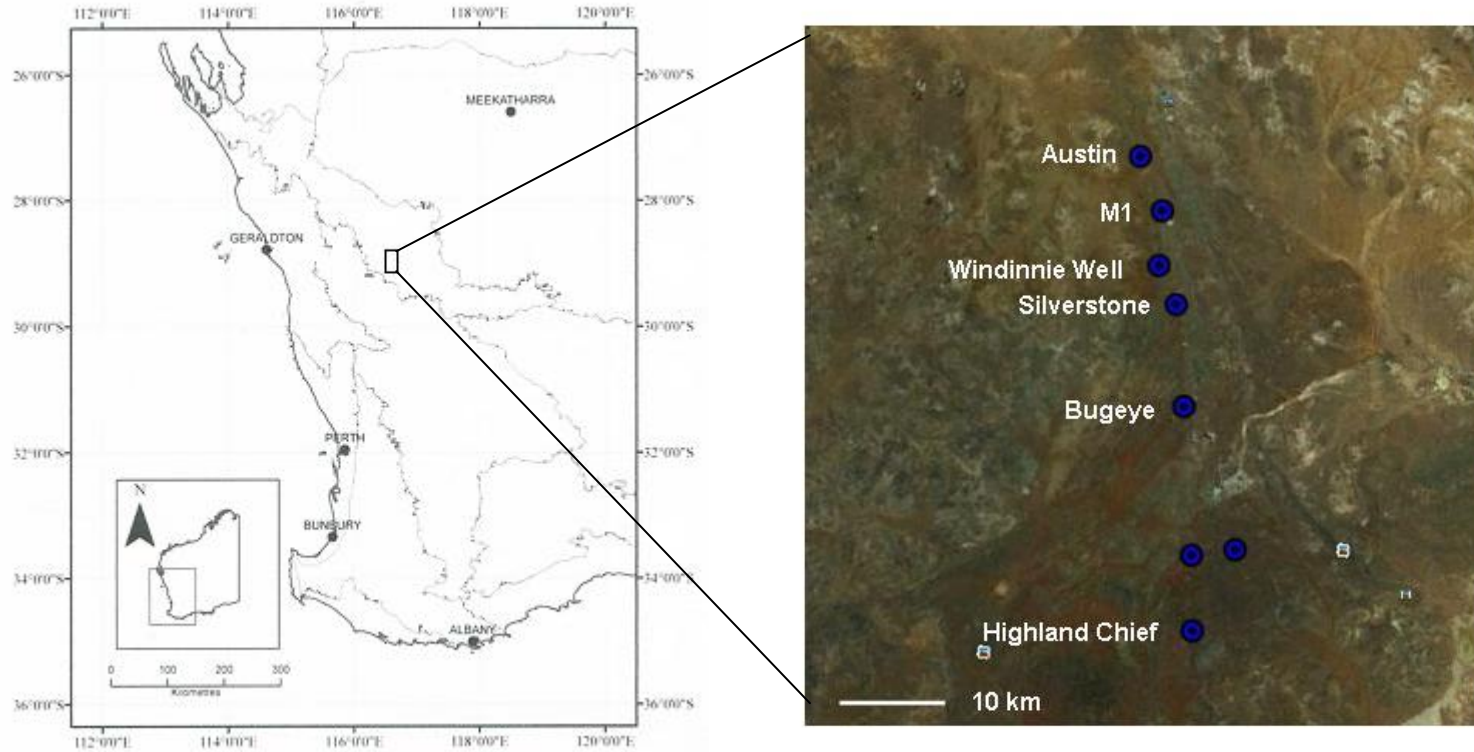


Figure 1: General location map and location of tenements

1.2 BACKGROUND AND SUPPORTING INFORMATION

The Minjar Gold Pty Ltd (MGPL) tenements are located approximately 70 km south south east of Yalgoo, on the boundaries of the de-stocked Badja and Warriedar Stations, in the central Talling district of the Yalgoo Bioregion of Western Australia, as defined by Thackway and Cresswell (1995).

From a vegetative perspective, the project area lies within the Yalgoo Subregion of the Austin Botanical District of the Eremaean Botanical Province (Beard 1976, 1990). The sub-region is an inter-zone between South-western Bioregions and Murchison. It is characterised by low woodlands to open woodlands of Eucalyptus, Acacia and Callitris on red sandy plains of the Western Yilgarn Craton and southern Carnarvon Basin, and is particularly rich in ephemerals.

Climate follows the Mediterranean pattern of the south west, with hotter summers and wetter winters but is also influenced by the tropical patterns to the north and the hot dry interior to the east, resulting in a flora with southern and northern influences as well as a distinct local assemblage.

Significant features of the central Yalgoo flora are centred around Banded Ironstone Formations (BIF). In proximity to the MGPL tenements are the Mount Singleton, Mount Gibson, Karara Blue Hills and Minjar Gnaws Nest BIF's, all containing habitat for flora of very high conservation value.

In recognition of the high levels of diversity and endemism in the Yalgoo bioregion, 23 % of the area has been placed in the conservation estate. In the central Talling district, former pastoral stations have been purchased by the Department of Environment and Conservation (DEC) with the intention of future inclusion into the conservation estate. The mineral resources of the region are of commercial value, and it is recognised that existing tenements and landscapes of conservation value are not mutually exclusive, and that mining development in the region must be considered against potential negative impacts on the diverse and endemic flora of the BIF. Only two BIF formations are currently in reserves, yet none are in National Parks or Class A reserves which offer the highest level of protection against disturbances such as mining.

2. METHODS

2.1 CONTRIBUTING AUTHORS

The strategy for the biological assessment of the MGPL project was developed and managed by APM Principal Biologist Dr Mitch Ladyman.

The field flora and vegetation component of this survey and associated reporting was undertaken by Mrs Eleanor Hoy, assisted by Mr Michael Adam.

Plant identifications were made by Frank Obbens with reference to the collection at the Western Australian Herbarium, Perth.

2.2 SURVEY CONDITIONS

The survey was undertaken at the end of above average winter and spring rainfall, hence conditions for field survey were ideal.

The total average accumulated rainfall for June to September inclusive is 114.2 mm (Table 1). However, 149.6 mm had fallen in the equivalent months prior to the current survey.

Table 1: Average Temperature and Rainfall Data for Yalgoo (Station 7091 Bureau of Meteorology)

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Years
<i>Temperature</i>													
Mean maximum temperature (°C)	37.2	36.3	33.5	28.5	23.0	19.2	18.2	20.0	24.0	27.5	32.1	35.5	1897 1975
Mean minimum temperature (°C)	20.7	20.7	18.6	14.5	10.1	7.7	6.2	6.8	8.7	11.4	15.2	18.4	1897 1975
<i>Rainfall</i>													
Mean rainfall (mm)	15.8	25.1	25.2	20.8	31.3	41.5	35.2	25.7	11.8	8.2	8.0	11.1	1896 2011
Median rainfall (mm)	8.2	11.6	10.0	8.7	23.6	35.8	29.5	20.6	8.9	4.2	2.8	4.2	1896 2011
2011 rainfall (mm)	69	127	N/A	3.1	35.9	34	74.4	22.8	18.4				2011

2.3 SURVEY METHODOLOGY

2.3.1 FLORA

Plants may be accorded Rare or Priority status when they are known only from a small number of populations, and when at least some of those populations are deemed to be under threat. Declared Rare (Threatened) Flora are protected under section 23F of the *Wildlife Conservation Act 1950-1979*, and it is an offence to “take” Rare Flora without ministerial permission. Section 23F defines “to take” as “...to gather, pick, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means.” Plants and ecological communities considered to have national conservation significance may also be listed under the *EPBC Act 1999*, and may not be damaged or destroyed without the permission of the Federal Minister for the Environment. Definitions of conservation codes for flora are provided in Appendix 1.

Species considered to be of national conservation significance are protected under the *EPBC Act 1999*. Under this Act, activities that may have a significant impact on a species of national conservation significance must be referred to the Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) for assessment.

2.3.2 FLORA AND VEGETATION SURVEY

This biological assessment survey fulfils the criteria for a Level 2 survey according to EPA Guidance Statement No. 51 on terrestrial flora and vegetation surveys for environmental impact assessment (EPA, 2004). It includes a ‘desktop’ review of flora and ecological communities of conservation significance from the study area, and a detailed survey that comprised extensive searching for Declared Rare and Priority flora, confirmation of existing vegetation classification and vegetation condition assessment.

The survey areas are roughly rectangular and cover (ha):

- Austin 54.0
- Windinne Well 89.38
- Silverstone 304.75
- Bugeye 123.71
- Highland Chief 78.44

All areas have historic clearing for exploration drilling and all sites excluding Austin contain extensive cleared areas for existing pits. Areas cleared prior to the current project are demarcated in the vegetation condition maps (Appendix 7 Figures 1 – 5).

2.3.2.1 DESKTOP ASSESSMENT

Undoubtedly, the most prominent environmental issue of the central Talling district is the management of mining interests against the conservation of highly specious and endemic plant communities of the banded ironstone formations and greenstone ranges (DEC 2007). The conservation value of the area containing the Mt Karara/Blue Hills Range (approximately 30 km to the east of MGPL) is considered high enough to warrant Class A reserve or National Park status. Yet, consideration of the triple bottom line principles (Environmental, Economic and Social), acknowledge the economic and social benefits of mining, and it is unlikely the area will be assigned this high level of environmental protection. Consequently, it is important that local planning for development reflects on the potential consequence to this and other nearby highly significant areas.

Prior to commencing the fieldwork, a number of database searches were undertaken. A search of the Department of Environment and Conservation's (DEC) Threatened (Declared Rare) Flora database and the Western Australian Herbarium (WAH) Specimen database were undertaken, covering the area between Minjar Hill south to Windanning Hill (NW corner 28°46'S, 116°52'E; SE corner 29°12'S, 117°02'E). This is an unusually large area for such a search, but was necessary as the sites are located along a north-south corridor roughly 48 km long. The results of the search are presented in Appendix 2. Together the database search produced four Threatened (Declared Rare) Flora (DRF) species and 40 Priority Plants for the area. Collection records from the WAH were reviewed to gain insight into habitat preferences for these species. An extensive number of prior flora reports on the MGPL tenements and surrounding tenements, including reports and management plans specifically for priority flora, as well as Florabase records and taxonomic keys, were consulted prior to mobilisation to assist field identification of these species.

An online search for matters of national significance and matters protected by the *EPBC Act* (1999) was undertaken using the Protected Matters Search Tool (DSEWPC, 2011). The search contained an area 75 km long and 25 km wide encompassing the MGPL tenements plus a 10 km buffer. Three critically endangered and two endangered plant species were identified in the search. Full search results are included as Appendix 3.

A search was undertaken on the DEC's Threatened Ecological Communities database for information on threatened and priority ecological communities occurring within the coordinates (North West Corner) 28°23'06.02"S, 116°41'00.18"E; (South East Corner) 29°38'36.64"S, 117°31'40.30"E. Fifty three records of Priority 1 Communities were listed as occurring within the extensive search area, falling into two main categories of Banded Ironstone Formations or Groundwater Assemblages. Full search results are listed in Appendix 4.

Extensive vegetation mapping and flora searches have been conducted in the MGPL tenements prior to this survey. Table 2 lists the prior work conducted in the tenements by author, content, month of field work and year.

The conservation value of the area, and therefore the potential future impacts, were also assessed in the context of the biogeographical regionalisation of Australia (Thackway and



Cresswell, 1995). Bioregions are large, geographically distinct areas of land with common characteristics such as physiography, climate, vegetation and animal communities. They represent lowest order of resolution between different flora and fauna habitats. There are 85 bioregions and 403 sub-regions in Australia, and they are described in the Australian Natural Resources Atlas (Australian Government, 2011) and the Biodiversity Audit of Western Australia (DEC 2003). A description of the relevant bioregion (Yalgoo) was read in order to identify regional and local issues of conservation significance.

Table 2: Flora and Vegetation reports conducted at Minjar Gold Pty Ltd tenements prior to 2011.

Report Code	Author	Surveyed areas	Scope	Month of Field Work	Year
200009	<i>Hart, Simpson and Associates</i>	M1 Silverstone Windinne Well Processing Facilities Transport Corridors	Landforms, flora, vegetation and fauna of the sites to look at the conservation values of the site and to provide information for environmental management of possible mining.	August	2000
200310	<i>Woodman</i>	Monaco Bugeye Highland Chief Haul Road	Survey of flora and vegetation as well as searching for Declared Rare (DRF) and Priority flora and Threatened Ecological Communities	September	2003
200312	<i>Woodman</i>	Monaco Bugeye Highland Chief Haul Road	Searching for and quantifying Priority flora populations within and outside of proposed disturbance footprints	September & November	2003
200403	<i>Gindalbie Gold</i>	Minjar North, Monaco, Bugeye, Highland Chief, Keronimo, Black Dog, Austin, Mug's Luck, Bobby McGee, Apollo, Promises, Western Corridor and Gossan Hill	Priority Flora Management Plan		2004
200403	<i>Woodman</i>	Keronimo Western Corridor Austin Mug's Luck Bobby McGee Apollo Promises	Flora and Vegetation Survey Declared Rare and Priority Flora searches TEC/PEC searches	January	2004
200608	<i>Ecotec</i>	Minjar North, Monaco, Bugeye, Highland Chief, Keronimo, Black Dog, Austin, Mug's Luck, Bobby McGee, Apollo, Promises, Western Corridor and Gossan Hill	Desktop Survey Priority Flora Handbook		2006
200611	<i>Ecotec</i>	Simca Ruby Lou Desiree Rotator Trench	Desktop Survey Field quantification of Priority Flora	November	2006
200706	<i>Woodman</i>	Beryl West Camp Elroy Elroy North Trench Bobby McGee Lexie	Flora and Vegetation Survey Declared Rare and Priority Flora searches	May	2007

Report Code	Author	Surveyed areas	Scope	Month of Field Work	Year
200908	<i>Mattiske</i>	Monaco	Flora and Vegetation Survey Declared Rare and Priority Flora searches TEC/PEC searches	July	2009
200909	<i>Mattiske</i>	Bugeye Eastern Creek	Flora and Vegetation Survey Declared Rare and Priority Flora searches TEC/PEC searches	July	2009
200912	<i>Mattiske</i>	Austin Keronima Silverstone Windinne Well	Flora and Vegetation Survey Declared Rare and Priority Flora searches TEC/PEC searches	November	2009
200401	<i>Mattiske</i>	Gindalbie Mine Lease Golden Grove*	Desktop assessment of field investigations of priority flora populations		2004

* not in MGPL tenements, but nearby

2.3.2.2 FIELDWORK

The fieldwork was undertaken from the 7th to the 18th November 2011.

Prior to commencing the fieldwork, reports listed in Table 2 were consulted to identify locations of previously recorded priority flora and vegetation communities. Vegetation maps and aerial photos were carried during fieldwork to confirm the boundaries and extent of plant communities and landforms. Survey areas were traversed on foot by a botanist and assistant for roughly two full days per site. Areas where priority flora or ecological communities were previously recorded were searched at high intensity until the presence or absence could be confirmed. Track logs were recorded on GPS to ensure maximum coverage of the areas and minimum overlap of search effort.

Where priority flora were suspected to occur, collections were made, waypoints marked with GPS (GDA 94, MGA zone 50 J) and population size estimated.

Vegetation condition, according to the modified Keighery scale (Table 3), was mapped continuously on the aerial photos.

Table 3: Vegetation Condition Rating Scale (adapted from Keighery 1994)

Vegetation Condition	Description
E - Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
VG - Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
G - Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
P - Poor	Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
VP - Very Poor	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.
D - Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Plants with unknown or uncertain identities were collected and pressed on site; these plants were compared with confirmed specimens housed at the Western Australian Herbarium to ensure correct identifications.

3. RESULTS

3.1 DESKTOP ASSESSMENT

3.1.1 REGIONAL REPRESENTATION

3.1.1.1 IBRA BIOREGIONS

Mapping for the Interim Biogeographic Regionalisation for Australia (IBRA version 6.1) programme placed the MGPL project area in the Yalgoo Bioregion. Yalgoo extends westwards to the boundary of the South-west Botanical Province and includes the Toolonga Plateau of the Southern Carnarvon Basin. This region is an interzone between the South-western Bioregions and the Murchison and is characterised by *Callitris* – *E. Salubris*, Mulga and Bowgada open woodlands and scrubs on earth to sandy earth plains rich in ephemerals. The climate is a crossover of Mediterranean influences from the south and semi-arid to arid and warm influences from the north. Acacia shrublands and Acacia forest and woodland dominate cover, estimated at 61 and 21 percent respectively. Hummock grasslands, Chenopod/samphire shrublands, and Eucalypt woodlands are also represented in lesser quantities. The Australian Native Vegetation Assessment (2001) estimates that 97.9% of pre European native vegetation cover persisted to 1997 in the Yalgoo Bioregion.

Known special features of the Yalgoo Bioregion include:

- Tallering Peak Ironstone and jaspilite range – unique landform and vegetation complexes. For example *Eriostemon sericeus* and *Thryptomene decussata* low shrublands.
- Banded Ironstone Mt Gibson ranges. Contains a significant number of endangered flora.
- Warradagga Rock. Granite outcrop with endangered flora and invertebrates in ephemeral ponds.
- Mt Singleton Ranges. Number of endangered flora with some unusual vegetation types.

The Biodiversity Audit of Western Australia (Dept. of CALM 2003) identified that area of Yalgoo under conservation reserve was skewed to a very large area in the North (Tooloonga Nature Reserve). In the interim period, Badja, Warriedar and Lochada Stations, surrounding MGPL, have been de-stocked with the intention of future addition to the Western Australian Conservation estate, and the White Wells Station has become the Charles Darwin Conservation Reserve.

3.1.1.2 RANGELAND LAND SYSTEM MAPPING

The Rangeland Land System Mapping for Western Australia dataset (Department of Agriculture and Food 2009) was consulted to further facilitate a broad assessment of the regional representation of vegetation that occurs in the study area. A land system is defined as ‘an area or group of areas, throughout which there is a recurring pattern of topography, soils and vegetation’. Seven land systems were mapped within the survey area by Payne *et al.* (1998):

Watson:	Hills, rises and gravelly plains on sedimentary rocks supporting <i>Acacia ramulosa</i> shrublands with non-halophytic undershrubs
Singleton:	Rugged greenstone ranges with dense <i>Casuarina</i> and <i>Acacia</i> shrublands
Graves:	Basalt and greenstone rises and low hills, supporting <i>Eucalyptus</i> woodlands with prominent saltbush and bluebush understoreys
Waguin:	Low breakaways with short stony and sandy plains, supporting <i>Acacia</i> shrublands and minor halophytic shrublands
Moriarty:	Low greenstone rises and stony plains supporting halophytic and <i>Acacia</i> shrublands
Illaara:	Gravelly plains supporting <i>Acacia aneura</i> – <i>Casuarina</i> shrublands
Tealtoo:	Level to gently undulating loamy plains with fine ironstone lag gravel supporting dense <i>Acacia</i> shrublands

Traverses of the vegetation in the central part of the survey area, in proximity to the MGPL tenements, were carried out by Payne *et al.* (1998), who described the vegetation as being in Very Good condition (ie free of obvious effects of grazing).

3.2 DESKTOP INTERPRETATION

3.2.1 THREATENED ECOLOGICAL COMMUNITIES

No threatened Ecological Communities were identified from the EPBC Act Protected Matters Report or the DEC Database

3.2.2 PRIORITY ECOLOGICAL COMMUNITIES

There are 74 Priority Ecological Communities (PECs) listed for the Mid West region. Of these, 11 Priority 1 ecological communities were identified from the DEC database search surrounding the MGPL tenements, with mining listed as the threatening process for all eleven.

Ninghan calcrete groundwater assemblage type on Moore palaeodrainage on Ninghan Station

Wagga Wagga and Yalgoo calcrete groundwater assemblage type on Yalgoo and Moore palaeodrainage on Wagga Wagga and Bunnawarra Stations

Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)

Mount Gibson Range vegetation complexes (banded ironstone formation)

Muralgarra calcrete groundwater assemblage type on Murchison palaeodrainage on Muralgarra Station

Bunawarra calcrete groundwater assemblage type on Moore palaeodrainage on Bunawarra Station

Minjar/Gnows Nest vegetation complexes (banded ironstone formation)

Warriedar Hill/Pinyalling vegetation complexes (banded ironstone formation)

Yalgoo vegetation complexes (banded ironstone formation)

Wolla Wolla (Gullewa) vegetation complexes (banded ironstone formation)

Badja calcrete groundwater assemblage type on Moore palaeodrainage on Badja Station

One Priority 3(i) community has been recorded in the district of MGPL, yet is also found outside of the district and the Mid-West;

Granite outcrop pools with endemic aquatic fauna.

Prior vegetation mapping (Mattiske 2009a) has identified the potential occurrence of Minjar/Gnows Nest vegetation complexes (banded ironstone formation) in the Windinne Well tenement area due to the presence of a small area of ironstone outcropping.

3.2.3 PROTECTED MATTERS SEARCH TOOL

The Protected Matters Search Tool returned four botanical ‘matters of national environmental significance’ close to the survey area. The critically endangered *Gyrostemon reticulatus*, *Hybanthus cymulosus* and *Pityrodia axillaris* and the endangered *Acacia imitans* and *Eremophila viscida* as species or species habitat likely to occur in the search area. A handbook was generated to aid in the identification of these species if encountered in the field. Existing herbarium records of these species are from isolated pockets, generally associated with the banded ironstone mountain tops and slopes.

Thundelarra Lignum Swamp is listed as an indicative place as well as a nationally important wetland along with Wagga Wagga Salt Lake.

3.2.4 THREATENED AND PRIORITY FLORA



Searches by the DEC Threatened Species Branch identified four Threatened (DRF) species *Acacia woodmaniorum*, *Eucalyptus crucis* subsp. *praecipua*, *Eucalyptus synandra*, and *Stylidium* sp. Yalgoo. The searches also produced 40 Priority plant taxa.

Review of prior local reports found priority flora to occur on the tenements. Threatened and Priority Flora from the database searches and prior local reports are listed in Table 4, along with their source.

Table 4: Threatened and Priority Flora previously recorded in or near MGPL tenements

Priority Code	Species	Habitat	Database		Field Survey					
			DEC	WAH	H&S (2000)	Wood -2003	Wood -2004	Eco - 2006	Wood -2007	Matt - 2009
T	<i>Acacia woodmaniorum</i>	Mid – upper slope bif	*	*						
T	<i>Eucalyptus crucis</i> subsp. <i>praecipua</i>	Granite	*							
T	<i>Eucalyptus synandra</i>	Sand with laterite or ironstone	*							
T	<i>Stylidium</i> sp. Yalgoo (D. Coultas et al Opp 01)	Red clay loam with exposed ironstone	*							
P1	<i>Acacia sulcatacaulis</i>	Rocky slopes, creeklines	*	*						
P1	<i>Baeckea</i> sp. Paynes Find (S Patrick 1095)		*							
P1	<i>Chamelaucium</i> sp. Warriedar (A.P. Brown & S. Patrick APB 1100)		*							
P1	<i>Chamelaucium</i> sp. Yalgoo (Y Chadwick 1816)	Granite outcrops	*			*	*			
P1	<i>Cuphonotus humistratus</i>		*							
P1	<i>Eucalyptus jutsonii</i> subsp. <i>kobela</i>		*							
P1	<i>Gunniopsis divisa</i>	Loam & quartz								*
P1	<i>Hydrocotyle</i> sp. Warriedar (PG Wilson 12267)	Red loam	*			*				
P1	<i>Labichea obrullata</i>		*							
P1	<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468)		*							
P1	<i>Micromyrtus mucronulata</i>				*					
P1	<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8)		*							
P1	<i>Rhodanthe collina</i>	Loam and rocky hills	*			*				
P2	<i>Acacia diallaga</i>	Basalt hills	*	*						

Priority Code	Species	Habitat	Database		Field Survey					
			DEC	WAH	H&S (2000)	Wood -2003	Wood -2004	Eco - 2006	Wood -2007	Matt - 2009
P2	<i>Acacia karina</i>	Rocky hills, bif	*	*					*	
P2	<i>Calandrinia kalanniensis</i>	outcropping	*	*						
P2	<i>Calandrinia</i> sp. Warriedar (F. Obbens 04/09)	Slopes and rises	*	*						
P2	<i>Persoonia karare</i>		*							
P3	<i>Acacia formidabilis</i>		*							
P3	<i>Acacia subsessilis</i>		*						*	
P3	<i>Angianthus micropodioides</i>		*							
P3	<i>Cyanicula fragrans</i>		*							
P3	<i>Drummondita fulva</i>	Shallow orange or red sandy loams on slopes and hilltops	*						*	*
P3	<i>Eremophila grandiflora</i>		*							
P3	<i>Gnephosis cassiniana</i>		*							
P3	<i>Gunniopsis rubra</i>	Granitic sandy loam	*							*
P3	<i>Korthalsella leucothrix</i>		*							
P3	<i>Menkea draboides</i>		*							
P3	<i>Micromyrtus acuta</i>	Sand on laterite and granite outcrops	*						*	*
P3	<i>Micromyrtus trudgenii</i>	Laterite, bif, quartz, dolerite and basalt hills	*			*	*	*	*	*
P3	<i>Petrophile pauciflora</i>		*						*	
P3	<i>Polianthion collinum</i>	Low hills and bif slopes	*					*		
P3	<i>Stenanthemum poecilum</i>		*							
P3	<i>Triglochin protuberans</i>		*							
P3	<i>Verticordia jamiesonii</i>		*							
P3	<i>Xanthoparmelia dayiana</i>		*							
P3	<i>Grevillea globosa</i>	Red loam and yellow sand and flats	*						*	*

Priority Code	Species	Habitat	Database		Field Survey					
			DEC	WAH	H&S (2000)	Wood -2003	Wood -2004	Eco - 2006	Wood -2007	Matt - 2009
P3	<i>Grevillea scabrida</i>	Ironstone gravel plain				*	*	*	*	*
P3	<i>Grevillea subtiliflora</i>	Loamy woodlands				*			*	
P3	<i>Persoonia pentasticha</i>	Laterite and ironstone slopes, red loam flats				*	*		*	*
P3	<i>Calytrix uncinata</i>	Granite or sandstone breakaways, rocky rises								*
P4	<i>Acacia speckii</i>	Rocky soil over granite, basalt or dolerite	*				*			
P4	<i>Dodonaea amplisemina</i>		*							
P4	<i>Goodenia neogoodenia</i>		*							
P4	<i>Haegiela tatei</i>	Clay sandy loam and gypsum in saline areas	*							
P4	<i>Wurmbea murchisoniana</i>		*							

3.3 FIELD SURVEY ASSESSMENT AND INTERPRETATION

3.3.1 FLORA

Detailed vegetation mapping and associated flora collections have been undertaken in the MGPL tenements numerous times (Hart & Simpson 2000; Woodman 2003, 2007; Mattiske 2003, 2009a-e). For the current project, these reports were consulted, and field verification of plant community composition and distribution occurred, rather than repetition of previous mapping and classification efforts. Thus, a full species presence list is not available in this report, but can be found in the reports referenced above and included in the appendices of this report.

Field survey efforts instead focussed heavily on the detection of flora of conservation significance, and searches of high intensity led to the detection of the flora contained in the subsequent sections.

3.3.1.1 PLANTS OF CONSERVATION SIGNIFICANCE

No Declared Rare Flora species, pursuant to subsection 2 of section 23F of the *Wildlife Conservation Act (1950)* were located during the survey. No plant taxa pursuant to section 179 of the *EPBC Act 1999* were located in the areas surveyed. Several plants of conservation interest were collected in the course of the survey however, listed as Priority flora. The locations of these specimens are shown on the vegetation condition maps in appendix 7 Figures 1 – 5 with GPS locations given in appendix 5. The species are discussed in the following sections with reference to their known distributions according to *Florabase* (DEC 2011a).

3.3.1.1.1 PRIORITY FLORA

***Acacia diallaga* Maslin & Buscumb FABACEAE (Priority 2)**

A dense spreading shrub that grows from 0.5-1.5 metres in height. The inflorescence is yellow during August - September. Occurs on skeletal, red, silty loam on lower slopes and may be found on the crest of low rocky basalt hills. *Acacia diallaga* was found in the Highland Chief tenement most numerous along a gully formation north of the existing pit, and in smaller scattered populations to the east and south west of the pit (Fig. 7). Herbarium records indicate a discontinuous distribution across the former pastoral stations Karara and Warriedar adjacent to MGPL (Maslin & Buscumb 2008). These stations are now owned and managed by the Department of Environment and Conservation as part of the Western Australian Conservation estate.

The presence of this restricted species in this region heavily influenced the designation of Central Yalgoo as a centre of endemism for Acacia (Gonzales-Orozco et al. 2011), thus locally is of high conservation significance.

Table 5: Population locations and sizes of *Acacia diallaga* Maslin & Buscumb (P2)

Tenement	Estimated Population size
Highland Chief	110+

***Mircomyrtus trudgenii* Rye MYRTACEAE (Priority 3)**

An erect, open shrub growing to 2 m tall. This species occurs on red-brown loamy clay on the tops and slopes of hills and ridges. The Western Australian State Herbarium has at least 29 records in the collection. This species was recorded numerous times at numerous sites, commonly in conjunction with *Drummondita fulva* (P3) and often constituting a major community component on the rocky rises common to the area.

Table 6. Population locations and sizes of *Mircomyrtus trudgenii* Rye (P3)

Tenement	Estimated Population size
Austin	110+
Windinne Well	650+
Bugeye	420+

***Drummondita fulva* A.S. Markey & R.A. Meissn. RUTACEAE (Priority 3)**

An erect, branching shrub from 0.5-1.5 m tall. Flowers are red and occur in September to October. This species grows on shallow, acidic soils of orange-red-brown sandy loams on clayey silts on lower to upper slopes. The Western Australian State Herbarium has more than 15 records in the collection. *Drummondita fulva* was found to comprise a major part of the understory in vegetation communities of rocky rises and skeletal soils of low slopes. Although listed as a Priority 3, this species

appears to be locally abundant, particularly on rocky rises, most often in conjunction with *Micromyrtus trudgenii* (P3).

Table 7. Population locations and sizes of *Drummondita fulva* A.S. Markey & R.A. Meissn (P3)

Tenement	Estimated Population size
Austin	400+
WindinneWell	600+
Bugeye	300+

***Grevillea globosa* C.A. Gardner PROTEACEAE (Priority 3)**

This species is a spreading, non-lignotuberous shrub growing from 1-3 m tall. This species has cream, white, green, red or brown flowers in January, June and November. It occurs on red loam and yellow sand. The Western Australian State Herbarium has over 23 records in the collection. The species was recorded in multiple locations in this survey, from scattered isolated small groups to a major understory component.

Table 8. Population locations and sizes of *Grevillea globosa* C.A. Gardner (P3)

Tenement	Estimated Population size
Austin	32
Silverstone	229+

***Grevillea subtiliflora* McGill PROTEACEAE (Priority 3)**

An erect spreading shrub growing from 1.5–2.5 m high. Inflorescence is white or green during July, August, September or October. It is suited to Red-brown loam. This species was present as an understory dominant on the south westerly aspect slope in the north east corner of the Highland Chief tenement, as well as in smaller scattered groups throughout the same tenement.

Table 9. Population locations and sizes of *Grevillea subtiliflora* McGill (P3)

Tenement	Estimated Population size
Highland Chief	67+

***Grevillea scabrida* C.A. Gardner PROTEACEAE (Priority 3)**

A densely & irregularly branched shrub, 0.6-1.5 m high. Flowers green-white/green-yellow/white in July. Herbarium collection records indicate a preference for red clay loam or stony loam in the Central Yalgoo region and into the margins of the Avon wheatbelt.

Table 10. Population locations and sizes of *Grevillea scabrida* C.A. Gardner (P3)

Tenement	Estimated Population size
Bugeye	2

Despite intensive searching, *Hydrocotyl* sp. Warriedar (P1) and *Rhodanthe collina* (P1) were not relocated at Highland Chief, as had been previously found (Woodman 2003). The locality where single small populations of each species were found, is one of very few creek lines that occur in the area, draining from both east and the west. Water is transported into this central shallow gully and terminates there. As a consequence, soils are higher in clay content and deeper than in the surroundings. Extensive disturbance in the form of road building and draining has occurred on the eastern and western edges of this area and it is unlikely that the hydrology that created the landform is still active, possibly accounting for the lack of *Hydrocotyl* sp. Warriedar and *Rhodanthe collina* in the current survey.

3.3.1.2 WEEDS

Vegetation assessments conducted by Hart, Simpson & Associates (2000), Woodman (2003) and Mattiske (2003, 2009a-e) identified eleven invasive weed species in low numbers. These were all herbaceous and grass species found mainly on disturbed ground or in wet areas. Most are also pastoral weeds, roadside weeds or weeds of agricultural and urban areas. Of the eleven identified weeds no weeds are defined as a Declared Weed pursuant to Section 37 of the *Agriculture and Related Resources Act 1976* [WA]. These weed species are all common and widespread in the region and cannot be controlled locally in small sites. Eighty

seven species of declared weeds are listed by the Department of Agriculture and Food (DAF 2011), as potentially occurring in the Yalgoo agricultural district. None of these were identified from the present field survey.

Table 11. Weed species recorded at MGPL tenements in previous surveys.

Species	Family	Field Survey		
		H&S (2000)	Wood (2003)	Mattiske (2009)
<i>Pentaschistis airoides</i>	Poaceae	*		
<i>Emex australis</i>	Polygonaceae	*		
<i>Cuscuta epithymum</i>	Cuscutaceae	*		*
<i>Sonchus oleraceus</i>	Asteraceae	*	*	
<i>Hypochaeris glabra</i>	Asteraceae	*		
<i>Cotula turbinata</i>	Asteraceae	*		
<i>Arctotheca calendula</i>	Asteraceae	*		
<i>Mesembryanthemum nodiflorum</i>	Aizoaceae			*
<i>Monoculus monstrosus</i>	Asteraceae			*
<i>Erodium cicutarium</i>	Geraniaceae			*

3.3.2 VEGETATION

3.3.2.1 VEGETATION UNITS (COMMUNITY TYPES)

The vegetation of the survey area encompasses a range of community types related to landscape, soils and disturbance. The descriptions presented here are reproduced from the most recent sources listed in Table 2. The sources of this information, including the vegetation distribution maps, are included in the appendices of this report. Community descriptions are reproduced here to give a greater understanding of the distribution of the flora of conservation significance encountered in the recent field survey, and in the context of ecological communities of conservation significance. Communities have been reviewed in light of the phytosociological work of Markey & Dillon (2008) in the BIF hills of the district.

Austin – Mattiske (2009b)

Callitris woodland

C3 - Low open woodland of *Callitris columellaris* over *Acacia ayersiana* and *Acacia ramulosa* var. *ramulosa* over *Ptilotus* spp., *Olearia* spp. And mixed low shrubs over *Goodenia* spp. On orange-red sandy-loam flats.

Acacia Shrublands

A1 – Tall open scrub of *Acacia ramulosa* var. *ramulosa* with *Acacia sibina* over *Eremophila forrestii* and mixed low shrubs over annuals on orange sandy loams on lower slopes and flats.

A6 – Tall open scrub of *Acacia ramulosa* var. *ramulosa* with *Acacia burkittii*, *Acacia tetragonaphylla* and *Grevillea obliquistigma* subsp. *obliquistigma* over *Philotheca brucei* subsp. *brucei* and *Scaevola spinescens* over annuals on orange brown sandy loam with rock cover on flats.

A17 – Tall open shrubland of *Acacia ramulosa* var. *ramulosa* with *Acacia tetragonaphylla* and *Acacia exocarpoides* over *Eremophila clarkei* and *Philotheca brucei* subsp. *brucei* over mixed low shrubs and annuals with occasional emergent *Eucalyptus horistes* on rocky orange-brown clayey-loam flats

A18 – Tall open shrubland of *Acacia ramulosa* var. *ramulosa* and *Acacia effusifolia* over *Philotheca brucei* subsp. *brucei*, *Grevillea obliquistigma* subsp. *obliquistigma* and *Aluta aspera* subsp. *hesperia* over mixed low shrubs over annuals, with emergent *Acacia aneura* var. *aneura* on orange-brown rocky slopes with occasional ironstone pebbles.

Priority 3 *Grevillea globosa* species was on located within the A1 vegetation community during this survey. This species was identified in moderate populations along the eastern corridor of the Austin site. (Appendix 6, Figure 4.1 & Appendix 7 Figure 5.1)

Shrublands

S8 – Open Shrubland of *Thryptomene costata* with occasional emergent *Acacia* spp., *Thryptomene decussata* and *Philotheca brucei* subsp. *brucei* over *Ptilotus schwartzii* and mixed low shrubs over annuals on red-brown slightly rocky clay flats with quartz and occasional ironstone pebbles.

Populations of *Mircomyrtus trudgenii* (P3) and *Drummondita fulva* (P3) at Austin were exclusively in the S8 community type (Appendix 6, Figure 4.1 & Appendix 7 Figure 5.1).

Windinne Well – Mattiske (2009a)

Acacia shrublands

A9 – Tall shrubland of *Acacia ayersiana*, *Acacia ramulosa* var. *ramulosa*, *Acacia aneura* with *Acacia sibina* and *Grevillea obliquistigma* subsp. *obliquistigma* over *Drummondita fulva* (P3), *Eremophila latrobei* subsp. *latrobei* and *Aluta aspera* subsp. *hesperia* with low shrubs over annuals on orange brown sandy loam with rock cover on slopes and ridges.

A22 – Tall open shrubland of *Acacia assimilis* subsp. *assimilis* and *Acacia ramulosa* var. *ramulosa* over *Philotheca brucei* subsp. *brucei* and *Eremophila shonae* subsp. *shonae* with *Micromyrtus trudgenii* (P3) and *Drummondita fulva* (P3) over annuals on orange- brown rocky shale and quartz upper slopes and ridges.

A23 – Tall open shrubland of *Acacia ayersiana* over *Thryptomene decussata* and mixed *Acacia* spp. with *Grevillea obliquistigma* subsp. *obliquistigma* over *Hibbertia arcuata* and mixed low shrubs over annuals on rocky orange-brown sandy loam on mid to upper-slopes.

Shrublands

S12- Open shrubland of *Baeckea benthamii* (ms), *Aluta aspera* subsp. *hesperia* and *Thryptomene* spp. over *Eremophila* spp. and mixed low shrubs over annuals, with occasional emergent *Acacia ayersiana* and *Acacia ramulosa* var. *ramulosa* on orange-brown rocky upper slopes and ridges with occasional exposed banded ironstone outcrops.

Micromyrtus trudgenii (P3) and *Drummondita fulva* (P3) were most prominent in communities A9 and A22, where they constitute a dominant understory component, but were also present in S12. (Appendix 6, Figure 4.2 & Appendix 7 Figure 5.2)

The Priority Ecological Community (PEC) Minjar/Gnows Nest vegetation complex (banded ironstone formation) is known from the Minjar area. A small area of exposed banded ironstone outcropping was seen by Matiske (2009b) and confirmed in the current investigation, in the north east corner of the Windinne Well survey area. The PEC is known to occur on hills and ironstone outcropping (Markey and Dillon 2008).

Silverstone – Matiske (2009c)

Eucalypt Woodlands

E5 – Low open woodland of *Eucalyptus horistes* over *Acacia ayersiana*, *Acacia effusifolia* and *Acacia sibina* with *Melaleuca nematophylla*, *Melaleuca laterifolia* subsp. *acutifolia* and *Hakea recurva* over mixed low shrubs and annuals on orange brown clay flats.

E6 – Open woodland of *Eucalyptus horistes* and *Callitris columellaris* over *Acacia ramulosa* var. *ramulosa* and *Acacia tetragonaphylla* over *Ptilotus* spp. and mixed low shrubs over chenopods and annuals on orange-red sandy loam on flats.

Acacia shrublands

A15 – Tall shrubland of *Acacia ayersiana* and *Acacia ramulosa* var. *ramulosa* with *Hakea recurva* and over *Ptilotus drummondii* var. *drummondii*, *Ptilotus obovatus* and *Scaevola spinescens* over chenopods and annuals with occasional emergent *Callitris columellaris* on orange-brown clayey loam on flats.

A16 – Tall open shrubland of *Acacia ramulosa* var. *ramulosa* with *Acacia tetragonophylla* and *Hakea recurva* over *Eremophila decipiens* subsp. *decipiens*, *Ptilotus* spp. and mixed low shrubs over chenopods and annuals on slightly rocky sandy-loam flats.

Grevillea globosa was identified along a north-south corridor to the east of the Silverstone pit. This species was recorded in multiple locations within this area and was considered to have a large population size (Table 8). Vegetation communities of E5 and A15, as described by Matiske (2009) supported this *Grevillea* species and have been included in appendices 6 and 7 with confirmed locations included. (Appendix 6, Figure 4.3 & Appendix 7, Figure 5.3)

Bugeye – Matiske (2009d)

Eucalypt woodlands

E3 – Low Woodland to Low Open Woodland of *Eucalyptus loxophleba* subsp. *supralaevis* over *Eremophila pantonii*, *Acacia burkittii*, *Exocarpos aphyllus*, *Senna artemisioides* subsp. *fillifolia* and *Eremophila* spp. over *Maireana triptera*, *Rhagoddrummondii*, *Ptilotus obovatus* and chenopods on orange-brown sandy loam on flats.

Grevillea scabrifolia was located within vegetation community of E3 (Appendix 6, Figure 4.4) in this survey (Table 10). This species was recorded to occur in a small population of woodland that is considered to be in very good condition (Appendix 7, Figure 5.4).

E4 – Low Open Woodland of *Eucalyptus loxophleba* subsp. *supralaevis* with *Eucalyptus striatocalyx* over *Eremophila pantonii*, *Exocarpos aphyllus* over *Tecticornia doleiformis*, *Maireana triptera*, *Maireana ?georgei*, chenopods and annuals on white-brown clay loam on flats.

Acacia shrublands

A11 – Tall shrubland of *Acacia ramulosa* var. *ramulosa* with *Acacia tetragonophylla* and *Acacia burkittii* over *Scaevola spinescens*, *Senna* sp. Austin and mixed low shrubs over *Ptilotus obovatus*, *Cheilanthes adiantoides* and annuals on orange sandy loam with rock cover on flats.

A12 – Shrubland of *Acacia ?kalgoorliensis* with *Eremophila oppositifolia* subsp. *angustifolia*, *Exocarpos aphyllus* and *Hakea preissii* over *Tecticornia doleiformis* with *Scaevola spinescens*, *Rhagodia drummondii*, *Frankenia ?setosa* and *Atriplex bunburyana* on orange-brown sandy loam with rock cover on flats.

A13 – Tall shrubland of *Acacia ramulosa* var. *ramulosa* with *Acacia burkttii*, *Acacia tetragonophylla* and *Acacia acuminata* over *Ptilotus obovatus*, mixed low shrubs and annuals on orange brown sandy loams on flats and slopes.

A14 – Tall shrubland of *Acacia ramulosa* var. *ramulosa* with *Acacia burkttii*, *Allocasuarina acutivalvis* subsp. *prinsepiana*, *Acacia sibina* and *Acacia ayersiana* over *Hibbertia arcuata* and mixed low shrubs on brown orange sandy loam with laterite pebbles on slopes.

Shrublands

S5 – Shrubland of *Dodonaea inaequifolia*, *Thryptomene costata*, *Acacia tetragonophylla* and *Hybanthus floribundus* subsp. *curvifolius* with occasional emergent *Allocasuarina dielsiana* on brown orange sandy loam granite outcropping on slopes.

S6 – Shrubland of *Aluta aspera* subsp. *hesperia* and *Drummondita fulva* (P3) with *Eremophila latrobei* subsp. *latrobei* with emergent *Allocasuarina acutivalvis* subsp. *prinsepiana*, *Acacia ramulosa* var. *ramulosa*, *Grevillea obliquistigma* subsp. *obliquistigma* and *Acacia burkttii* on light brown sandy loam with laterite pebbles on laterite breakaways and ridges.

S7 – Tall open shrubland of *Melaleuca lateriflora* subsp. *lateriflora* and *Acacia burkttii* with *Eremophila oppositifolia* subsp. *angustifolia*, *Eremophila oldfieldii* subsp. *oldfieldii* and mixed shrubs over *Scaevola spinescens* and mixed low shrubs on light brown sandy loam with rock cover at the base of a laterite breakaway.

Micromyrtus trudgenii (P3) and *Drummondita fulva* (P3) are distributed in the community types S5 and S6. (Appendix 6 Figure 4.4 & Appendix 7, Figure 5.4)

Highland Chief – Woodman (2003)

Woodlands

W1 – Open Low Woodland of mixed *Eucalyptus* species over Thicket to Scrub of *Acacia* species over a Dwarf Scrub of mixed species over Herbs on red loamy soils with gravel. W1 was the most widespread Woodland community mapped. It was present over a large portion of the northern section of the survey area and was dominated by mixtures of *Eucalyptus loxophleba* subsp. *supralaevis* and *Eucalyptus oldfieldii* over *Acacia ramulosa* var. *ramulosa*, *A. aneura*, *A. tetragonophylla*, *A. acuminata* and *A. ?assimilis* subsp. *assimilis*. A total of 93 plant species were

recorded in this community during this survey, including six of the Priority Flora species.

W2 – Open Low Woodland of *Eucalyptus salmonophloia* and *Eucalyptus loxophleba* subsp. *supralaevis* over Open Scrub on red silty clay with quartz pebbles. Woodland W2 was only recorded in the Highland Chief area where it covered a large section of the southern half of this lease area. It was the only community in which *Eucalyptus salmonophloia* was recorded. The understorey was sparse and dominated by *Eremophila scoparia* and *Eremophila oldfieldii* subsp. *angustifolia*. A total of 17 plant species were recorded in this community during this survey.

W4 – Low Woodland of *Eucalyptus sheathiana* and *Eucalyptus ?striaticalyx* over Low Scrub of mixed shrubs over Open Herbs on red loamy-clay on rocky ground. Plant community W4 was only mapped in the northern section of the Highland Chief area. The understorey was variable in height and cover but was often dominated by *Eremophila oldfieldii* subsp. *angustifolia*. A total of 23 plant species were recorded in this community during this survey, with low species numbers reflecting the high cover of bare, rocky ground.

W9 – Low Woodland to Scrub dominated by *Allocasuarina acutivalvis* ?subsp. *prinsepiana* on red-brown soils on rocky ground. Plant community W9 was recorded over the entire project area. The shrub layer was very variable with *Acacia* species most common. A total of 82 plant species were recorded in this community during this survey, including six Priority Flora species.

Populations of *Grevillea subtiliflora* (P3) are located exclusively in the W9 community of the Highland Chief tenement. *Acacia diallaga* (P2) is distributed across the W9 and W4 communities' (Appendices 6, Figure 4.5 & 7, Figure 5.5).

Thickets and Scrubs

T1 – Thicket to Dense Thicket dominated by *Acacia ramulosa* var. *ramulosa* over a Low Scrub of mixed species over Herbs on red loamy soils with some gravel. T1 was widespread over the project area, particularly in the northern section. It corresponds to the *Acacia ramulosa* shrublands mapped by Hart Simpson and Associates (2000) in the same area. The composition of the shrub layer was highly variable, which is reflected in the high number of plant species recorded (84).

T4 – Thicket to Scrub dominated by *Melaleuca hamata*, *Allocasuarina acutivalvis* subsp. *prinsepiana* and *Acacia* species on red loamy-clay on rocky ground. T4 was mapped in the Highland Chief area and the very southern end of the proposed access track. These areas differed from the other Thickets in that several genera were co-dominant. *Acacia acuminata* was the most common *Acacia* in these areas, with *Allocasuarina dielsiana* and *Melaleuca radula* also common. A total of 30 plant species were recorded in this community during this survey.

3.3.2.2 VEGETATION CONDITION

In terms of the condition rating scale (Table 3) the vegetation condition ranged from Very Good (VG) to Completely Degraded (D) across the survey areas (Appendix 7, Figures 5.1-5.5). The main impacts were from old earthworks and vehicular disturbance, historic grazing from when the pastoral leases were active, current grazing by feral goats and a few minor weed incursions.

The feral goats preferred the areas adjacent to the pits so there was an improvement in condition with distance to the pit. Feral goats graze and browse the vegetation, but the major contribution to declining vegetation condition comes from their propensity to knock shrubs over, breaking them at the base or pulling them out of the ground. In locations where large groups of goats spend large amounts of time, only the tall shrubs with woody stems too thick to break persist.

A very limited amount of restoration has been carried out on exploration tracks, confined to deep ripping in small sections. Where this has occurred good regrowth is apparent, yet most tracks remain open. The dissection of the vegetation by exploration tracks increases the edge effect and impacts the way water flows through the ecosystem. There are very few drainage lines in these localities and surface flow of water generally occurs as sheet flow over the soil surface. The presence of ground disturbances and tracks will divert flows and may cause channelling, erosion and prohibit water from flowing. Increased canopy gaps caused by tracks also affects the air flow and temperatures experienced beneath the canopy, increasing the desiccation of vegetation in the hot dry summer months. For these reasons, even where the vegetation structure is intact, the condition of the vegetation surveyed is at best Very Good.

4. DISCUSSION

The biological assessment survey fulfilled the criteria for a Level 2 'detailed' survey according to EPA Guidance Statement No. 51 on terrestrial flora and vegetation surveys for environmental impact assessment (EPA, 2004).

4.1 THREATENED AND PRIORITY PLANTS

The EPBC Protected Matters search of the locality identified the critically endangered *Gyrostemon reticulatus*, *Hybanthus cymulosus* and *Pityrodia axillaris* and the endangered *Acacia imitans* and *Eremophila viscida* as species or species habitat potentially occurring in the search area. These species were not identified in the search.

Consequent to the large search area and the underlying diversity and endemism of the region, a large number of conservation value flora are listed in the DEC database as potentially occurring in the MGPL tenements. Prior surveys also confirmed the likelihood of conservation value flora within the tenements investigated. As a result, field survey efforts focussed on intense search efforts to confirm the presence or absence of conservation value flora. No species listed as threatened on the DEC Threatened Species Database was identified from the search areas, nor species listed as Priority level 1.

The Priority 2 species *Acacia diallaga* is present in the Highland Chief tenement, most numerous through a rocky gully and lower slope to the north and east of the existing pit, and a small population to the south west of the pit. This species is locally of high conservation significance and features heavily in the designation of the Central Yalgoo district as a centre of endemism for *Acacia* in Australia (Gonzales-Orozco 2011). This species was discovered in 2006 on the former Karara Station to the east of MGPL, formally described in 2008 (Maslin & Buscombe 2008), and had not previously been recorded in MGPL tenements. The distribution of the species is thought to be entirely within the boundaries of the former Karrara and Warriedar Stations, now owned and managed by the DEC with the intention of being added to the conservation estate in the future.

Five Priority 3 species were identified in the searches, *Drummondita fulva*, *Micromyrtus trudgenii*, *Grevillea subtiliflora*, *G. globosa* and *G. scabrida*. All of these species had previously been identified on MGPL tenements.

Drummondita fulva and *Micromyrtus trudgenii* are locally abundant, commonly comprising understory dominants in the vegetation communities of the rocky rises and slopes within the MGPL tenements investigated. In the current survey, these species were recorded in the hundreds, as with previous surveys of the same areas. Both species are locally abundant within their ranges, but are spatially restricted to the rocky hills and breakaways between Perenjori, Paynes Find and Yalgoo (Meissner & Markey 2007; Rye 2007). All known populations of *M. trudgenii* and most of *D. fulva* are within mining tenements.

Grevillea globosa is widely distributed among the tenements, from the northernmost Austin to the central Silverstone. The largest population occurs in the western to south western part of the Silverstone tenement where the species is a major community component and

individuals number in the hundreds. All other occurrences were smaller, scattered groups of 1 to 5 individuals. *Grevillea subtiliflora* occurs in the Highland Chief tenement as a significant component of the understory vegetation on the slope to the north east of the existing pit. Populations of *Acacia diallaga* (P2) share the same slope, and thus protection of *A. diallaga* populations will, in effect, protect the larger population of *G. subtiliflora* by default. Two individuals of *Grevillea scabrada* were located at the Bugeye tenement, and have been identified there before in sparse, scattered groups of one to three individuals. These three *Grevillea* species have been long described and considered locally numerous, but spatial distribution is restricted to the central Yalgoo bioregion and into the margins of the adjacent Avon wheatbelt. Clearing of the scattered groups of individuals is unlikely to have a negative impact on the health and vigour of the overall populations, yet preservation of the larger populations should be favoured.

4.2 THREATENED OR PRIORITY ECOLOGICAL COMMUNITIES

No TEC's or PEC's were identified in the tenements within the course of this investigation. There is however, as noted in previous survey efforts, a small outcropping of banded ironstone in the north east corner of the Windinne Well tenement. Vegetation community composition and structure is consistent with the surrounding communities of rocky rises and slopes, comprises less than 0.5 ha, and is currently dissected by exploration access roads and drill pads. Yet the area can be seen as potential habitat for BIF specialists occurring regionally and with high conservation significance.

Ecological communities of high conservation significance in the Mount Singleton, Mount Gibson, Karara/Blue Hills and Gnows Nest/Minjar Hills localities are distant enough and separated by landscape barriers to be adequately protected from impacts due to clearing at MGPL. Comparison of vegetation communities in these localities (Markey & Dillon 2008) with communities at MGPL confirms that many of the perennial woody species are distributed throughout the lower landscape and up to the lower slopes of the BIF hills, but the lower parts of the landscape where MGPL is situated, does not contain the large number of restricted and endemic species of the BIF ranges.

4.3 DECLARED PLANTS

Weeds that have the potential to become serious problems are listed as Declared Plants under the Agriculture and Related Resources Protection Act 1976. Weeds species that were identified in this and previous surveys are not declared plants under the Agriculture and Related Resources Protection Act 1976.

Therefore any development plans for the survey area would not require specific measures to prevent the spread of weeds beyond the site boundaries or to eradicate populations.

4.4 VEGETATION CONDITION

The overall condition of the vegetation is negatively impacted by the presence of large numbers of feral goats and the clearing of exploration corridors and drill pads. Vegetation structure and species richness are unaffected by these disturbances except for small areas near to the existing pits or infrastructure. Fundamental ecosystem functions and processes such as recruitment and distribution of water infiltration are affected however, and may influence the health and vigour of the vegetation in the long term. Areas near to existing pits where mechanical disturbance and grazing are high are in poor condition, with condition increasing with distance from the pits.

4.5 SURVEY LIMITATIONS

Survey limitations

4.6 RECOMMENDATIONS

Although technically the MGPL tenements are not on a BIF, they are in close proximity. Conservation principles and guidance have been developed to facilitate the concurrent goals of resource extraction and biological preservation of BIF and prescriptive management actions are made here in accordance with these principles.

Key Principles

- i. No development activity to proceed in the Yilgarn Craton BIF's that would result in the IUCN Threat Category of any given plant or animal taxon increasing. i.e. initially not being listed as threatened under any category to being listed (the three IUCN categories for threatened species being Vulnerable, Endangered or Critically Endangered), or increasing from Vulnerable to Endangered, or from Endangered to Critically Endangered.
- ii. No development activity to proceed in the Yilgarn Craton BIF's that would result in the IUCN threat category of any ecological community increasing from not being listed as threatened under any category to being listed, or where already listed (or qualifying for listing) as a TEC, having it's actual or recommended Threat Category increased (i.e. from Vulnerable to Endangered or from Endangered to Critically Endangered).
- iii. 15 % - 30 % of the total number of ranges should be reserved in their entirety, protecting complete examples of the landform and ecosystems. Examples of the most outstanding BIF ranges should be protected in their entirety where development has not significantly progressed, e.g. the Helena-Aurora Range (consistent with recommendations in EPA Bulletin 1256). The initial objective should be to conserve 15 % of ranges in their entirety. The DEC has completed 2 years of a 3 year flora survey program, and, when completed, a review should be undertaken to further define the list of ranges requiring reservation in their entirety, with the objective of achieving at least 30 % target.

Recommendations

1. All individuals of *Acacia diallaga* (P2) are to be retained with a 50 m buffer. This action will effectively preserve the largest population of *Acacia subtiliflora* (P3), and the habitat where *Rhodanthe collina* (P1) and *Hydrocotyl* sp. Warriedar (P1) were historically located.
2. The area containing the small section of banded ironstone outcropping in the north east corner of the Windinne Well tenement is to be preserved with a 50 m buffer.
3. Clearing of communities containing *Drummondita fulva* (P3) and *Micromyrtus trudgenii* (P3) are to be minimised where possible. Clearing the full extent of these communities within the tenements would not cause their conservation rating to increase, yet the restriction of their natural range increases their vulnerability to both natural and human induced disturbances. As inhabitants of rocky areas with skeletal soils, likelihood of successful rehabilitation of their habitat or populations is low (Yates 2011).
4. The three Priority 3 Grevilleas are more widely distributed than the (P3) species above, and the mostly small scattered occurrences at MGPL do not contribute a major proportion of their range or populations. The large population of *Grevillea globosa* on the south east corner of the Silverstone tenement should be preserved if practical, however clearing poses no real threat to the health and vigour of the overall population.
5. Goat populations at MGPL are considerable, possibly due to access to permanent water in the pits. Control of goat populations at MGPL will improve the condition of remnant vegetation, and potentially remove a population source that may benefit the region as a whole. Successful goat control action for the region may aid the conservation of BIF communities nearby and be utilised as an environmental offset.

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APPENDIX 1 – DEFINITIONS OF CONSERVATION CODES FOR FLORA

THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DECLARED RARE AND PRIORITY FLORA LIST

for Western Australia

CONSERVATION CODES

R: Declared Rare Flora - Extant Taxa

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

X: Declared Rare Flora - Presumed Extinct Taxa

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

1: Priority One - Poorly known Taxa

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

2: Priority Two - Poorly Known Taxa

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

3: Priority Three - Poorly Known Taxa

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

4: Priority Four - Rare Taxa

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

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

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ABBREVIATIONS USED IN THREATENED FLORA DATABASE PRINTOUTS

VESTING

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

PURPOSES

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

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



APPENDIX 2 – DEC THREATENED (DECLARED RARE) DATABASE SEARCH RESULTS

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

SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
<i>Acacia diallaga</i>	2	MW	Karara, Warriedar	September
<i>Acacia formidabilis</i>	3	MW,WB,GLD	Wanarra, Perenjori, Paynes Find, Southern Cross, Warralackin, Bungalbin Hill	
<i>Acacia karina</i>	2	MW	Blue Hill Range, Karara, Mt Gibson Stn	-
<i>Acacia speckii</i>	4	MW	Nannine, Yalgoo, Norie Stn, Coodardy Stn, Meekatharra, Madoonga Stn	
<i>Acacia subsessilis</i>	3	MW	Yalgoo, Fields Find	Jul-Aug
<i>Acacia sulcicaulis</i>	1	MW	Warriedar Stn	Sept
<i>Acacia woodmaniorum</i>	T	MW	Blue Hill Range, Karara	-
<i>Angianthus micropodioides</i>	3	MW,WB,SW	Perth, Meckering, Mongers Lake, Bunjil, Warriedar, Mollerin	
<i>Baeckea</i> sp. Paynes Find (S Patrick 1095)	1	MW	Paynes Find, Warrdagga Rock, Ninghan Stn	Aug-Oct
<i>Calandrinia kalanniensis</i>	2	WB	Kalannie, Petrudor Rock, Xantippe Rock, Karara Station, Bonnie Rock, Yanneymooning NR, Hughden Rock	Dec-Jan
<i>Calandrinia</i> sp. Warriedar (F. Obbens 04/09)	2	MW	Warriedar Stn, Karara Stn., Morawa	Sep
<i>Chamelaucium</i> sp. Warriedar (A.P. Brown & S. Patrick APB 1100)	1	MW	Warriedar Stn, Karara Stn, Paynes Find	Sept
<i>Chamelaucium</i> sp. Yalgoo (Y Chadwick 1816)	1	MW	Paynes Find, Wurarga	
<i>Cuphonotus humistratus</i>	1	MW,*	Paynes Find, NSW	
<i>Cyanicula fragrans</i>	3	MW	Paynes Find, Bimbijy Stn, Beacon, Mullewa, Mourobra, Moonagin Hills	Aug-Oct
<i>Dodonaea amplisemina</i>	4	MW	Ninghan Stn, Cue, Paynes Find	
<i>Drummondita fulva</i>	3	MW	Lochada, Karara	Sep-Oct
<i>Eremophila grandiflora</i>	3	MW	Paynes Find	Jul-Sep
<i>Eucalyptus crucis</i> subsp. <i>praecipua</i>	T	MW	S of Paynes Find	Dec-Mar
<i>Eucalyptus jutsonii</i> subsp. <i>kobela</i>	1	MW	Karara	
<i>Eucalyptus synandra</i>	T	MW,WB	Paynes Find-Koorda, Morawa	Feb
<i>Gnephosis cassiniana</i>	3	MW	Binnu, Mongers Lake, Warriedar, Mullewa,	
<i>Goodenia neogoodenia</i>	4	MW	Eurardy, Yalgoo, Mt Magnet, Burnerbinmah Stn	Aug
<i>Grevillea globosa</i>	3	MW	Pindar, Mt Harry, Edamurta Range, Gossan Hill, Talling Stn, Badja Stn	Jan
<i>Gunniopsis rubra</i>	3	WB,MW,GLD	Perenjori, Paynes Find, Ballidu, Bullfinch, Laverton, Dalwallinu, Yalgoo, Nungarin, Bencubbin, Merredin, Wogarl, Hines Hill, Cunderdin	Sep-Oct
<i>Haegiela tatei</i>	4	SC,WB,MW, GLD	Grass Patch, Lake Lockhart, Lake King, Badja Station, Peak Charles N.P., Lake Grace, Lake Magenta N.R., Lake Lockhart, Lake Cronin, Jaurdi Stn.	-
<i>Hydrocotyle</i> sp. Warriedar (PG Wilson 12267)	1	MW	Warriedar Stn	
<i>Korthalsella leucothrix</i>	3	MW,GLD	Lake Monger, Wanarra Rock, Kent Bore, Gibson Desert	-
<i>Labichea obrullata</i>	1	MW	West of Yalgoo	Oct

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

SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
Lepidosperma sp. Blue Hills (A. Markey & S. Dillon 3468)	1	MW	Karara, Blue Hills Range	
Menkea draboides	3	MW,WB,SC, GLD	Watheroo, Yilgarn, Meekatharra, Paynes Find, Yardina Rock	Aug,Sep
Micromyrtus acuta	3	MW	Paynes Find, Warriedar, Lake Monger, White Wells, Blue Hill Range	Jun,Sep
Micromyrtus trudgenii	3	MW	Warriedar Hill, Gossan Hill, Yalgoo, Golden Grove, Karara, Mungada	Jul
Persoonia kararae	2	MW	Karara Station, Toolonga NR	-
Petrophile pauciflora	3	MW,WB	Bimbiji, Mt Magnet, Mileura, Woolgorong, Paynes Find, Kalli, Karara, Madoonga	Aug
Polianthion collinum	3	MW	Yalgoo (Gossan Hill)	
Prostanthera sp. Karara (D. Coultas & K. Greenacre Opp 8)	1	MW	Karara Stn., Lochada Stn.	Sep
Rhodanthe collina	1	MW	Monger Lake, Yalgoo, Mt Gibson, Mingenew Hill	Aug,Sep
Stenanthemum poicilum	3	MW,SC	Wilroy, Canna, Bremer Range, Warriedar Station, Yilgarn, Geraldton	May-Jun,Oct
Stylidium sp. Yalgoo (D. Coultas et al. Opp 01)	T	MW	Warriedar Stn, Karara Stn, Badja Stn	
Triglochin protuberans	3	SC,MW,GLD	Stirling Range NP, Malcolm, Yalgoo, Burnerbinmah Stn, Arrowsmith	Aug-Oct
Verticordia jamiesonii	3	MW,GLD	Mt Hale, Yalgoo, Cue, Sth Warburton, Waterfall Gorge, Rowe Hills	Sep
Wurmbea murchisoniana	4	MW,GLD,SC	Murchison R., Jingemarra, Wanarra Rk, 71 Mile Rk, Coonmine Well, Balladonia	Jul-Sep
Xanthoparmelia dayiana	3	MW,GLD,*	Kalgoorlie, Northern Territory, Karara	



APPENDIX 3 – EPBC MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE



EPBC Act Protected Matters Report: Coordinates

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

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

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

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[Summary](#)

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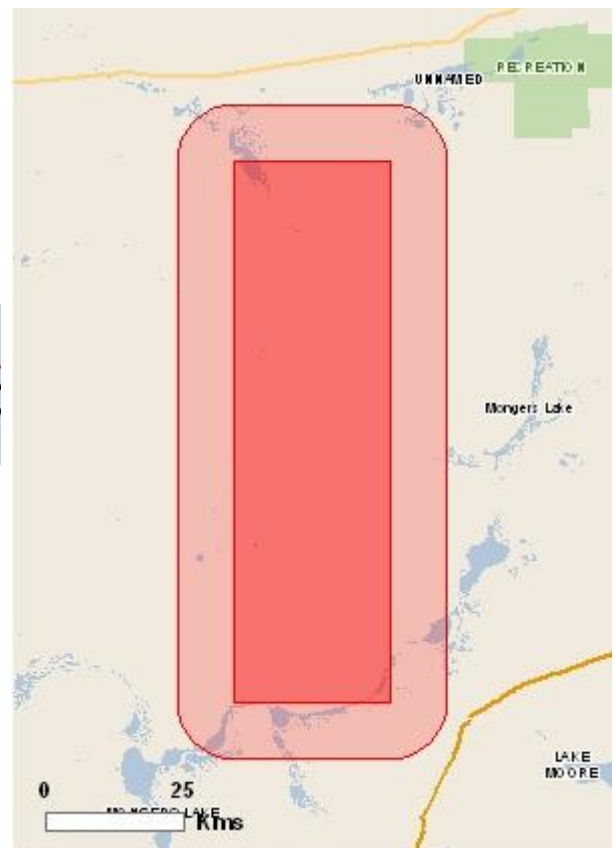
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Buffer: 10.0Km

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance (Ramsar Wetlands):	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	8
Migratory Species:	7

Other Matters Protected by the EPBC Act

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

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

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

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

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	4
Whales and Other Cetaceans:	None

Critical Habitats:	None
Commonwealth Reserves:	None

Report Summary for Extra Information

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

Place on the RNE:	1
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	5
Nationally Important Wetlands:	2

Details

Matters of National Environmental Significance

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

Name	Status	Type of Presence
------	--------	------------------

BIRDS

[Acanthiza iredalei iredalei](#)

Slender-billed Thornbill (western) [25967]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

[Leipoa ocellata](#)

Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
------------------	------------	--

PLANTS

[Acacia imitans](#)

Gibson Wattle [65211]	Endangered	Species or species habitat likely to occur within area
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[Eremophila viscida](#)

Varnish Bush [2394]	Endangered	Species or species habitat may occur within area
---------------------	------------	--

[Gyrostemon reticulatus](#)

Net-veined Gyrostemon [8491]	Critically Endangered	Species or species habitat may occur within area
------------------------------	-----------------------	--

[Hybanthus cymulosus](#)

Ninghan Violet [2803]	Critically Endangered	Species or species habitat likely to occur within area
-----------------------	-----------------------	--

[Pityrodia axillaris](#)

Native Foxglove, Woolly Foxglove [17376]	Critically Endangered	Species or species habitat may occur within area
--	-----------------------	--

REPTILES

[Egernia stokesii badia](#)

Western Spiny-tailed Skink [64483]	Endangered	Species or species habitat likely to occur within area
------------------------------------	------------	--

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

Name	Status	Type of Presence
------	--------	------------------

Migratory Marine Birds

[Apus pacificus](#)

Fork-tailed Swift [678] Species or species habitat may occur within area

[Ardea alba](#)

Great Egret, White Egret [59541] Species or species habitat may occur within area

[Ardea ibis](#)

Cattle Egret [59542] Species or species habitat may occur within area

Migratory Terrestrial Species

[Leipoa ocellata](#)

Malleefowl [934] Vulnerable Species or species habitat likely to occur within area

[Merops ornatus](#)

Rainbow Bee-eater [670] Species or species habitat may occur within area

Migratory Wetlands Species

[Ardea alba](#)

Great Egret, White Egret [59541] Species or species habitat may occur within area

[Ardea ibis](#)

Cattle Egret [59542] Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species

[\[Resource Information \]](#)

Name	Status	Type of Presence
------	--------	------------------

Birds

[Apus pacificus](#)

Fork-tailed Swift [678] Species or species habitat may occur within area

[Ardea alba](#)

Great Egret, White Egret [59541] Species or species habitat may occur within area

[Ardea ibis](#)

Cattle Egret [59542] Species or species habitat may occur within area

[Merops ornatus](#)

Rainbow Bee-eater [670] Species or species habitat may occur within area

Extra Information

Places on the RNE

[\[Resource Information \]](#)

Note that not all Indigenous sites may be listed.

Name	Status
------	--------

Natural

[Thundelarra Lignum Swamp WA](#)

Indicative Place

Invasive Species

[\[Resource Information \]](#)

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

Name	Status	Type of Presence
------	--------	------------------

Mammals

[Capra hircus](#)

Goat [2] Species or species habitat likely to occur within area

[Felis catus](#)

Cat, House Cat, Domestic Cat
[19]

Species or species habitat likely to occur within area

[Oryctolagus cuniculus](#)

Rabbit, European Rabbit [128]

Species or species habitat likely to occur within area

[Vulpes vulpes](#)

Red Fox, Fox [18]

Species or species habitat likely to occur within area

Plants

[Cenchrus ciliaris](#)

Buffel-grass, Black Buffel-grass
[20213]

Species or species habitat may occur within area

Nationally Important Wetlands

[Resource Information]

[Wagga Wagga Salt Lake, WA](#)

[Thundelarra Lignum Swamp, WA](#)

Caveat

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

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

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

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

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

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

- migratory and
- marine

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

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed

- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

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

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

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

Coordinates

-28.4881 116.84289,-28.4881 117.09987,-29.37326 117.09987,-29.37326 116.84289,-28.4881 116.84289

Acknowledgements

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

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- Other groups and individuals

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



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APPENDIX 4 – THREATENED & PRIORITY ECOLOGICAL COMMUNITIES DATABASE SEARCH

DEC unique occurrence Identifier	Community Name ID	Community name	State listed Category of Threat	Number of Site IDS	First site identifier	Buffer radius of site ID
3528	Ninghan Calcrete	Ninghan calcrete groundwater assemblage type on Moore palaeodrainage on Ninghan Station	Priority 1	1	Ninghan01	27500
3387	Wagga Wagga and Yalgoo Calcrete	Wagga Wagga and Yalgoo calcrete groundwater assemblage type on Yalgoo palaeodrainage on Wagga Wagga Station and Moore Palaeodrainage on Yoweragabbie Station	Priority 1	1	Wagga_wagga	24000
2596	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 4	2500
3490	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 5	750
3492	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 6	300
3493	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 7	3500
3494	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 8	500
3495	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 9	500
2485	Mount Gibson	Mount Gibson Range vegetation complexes	Priority 1	1	Ext Hill Nth	1500

		(banded ironstone formation)				
2485	Mount Gibson	Mount Gibson Range vegetation complexes (banded ironstone formation)	Priority 1	1	Ext Hill Sth	1500
3373	Muralgarra Calcrete	Muralgarra calcrete groundwater assemblage type on Murchison palaeodrainage on Muralgarra Station	Priority 1	1	Muralgarra	16000
2769	Bunnawarra Calcrete	Bunnawarra calcrete groundwater assemblage type on Moore palaeodrainage on Bunnawarra Station	Priority 1	1	Bunnawarra	14000
2587	Minjar/Gnows Nest	Minjar/Gnows Nest vegetation complexes (banded ironstone formation)	Priority 1	1	Minjar/Gnows Nest	30000
2586	Warriedar Hill/Pinyalling	Warriedar Hill/Pinyalling vegetation complexes (banded ironstone formation)	Priority 1	1	Pinyalling	22500
2622	Mount Gibson	Mount Gibson Range vegetation complexes (banded ironstone formation)	Priority 1	1	Iron Hill East	500
2620	Mount Gibson	Mount Gibson Range vegetation complexes (banded ironstone formation)	Priority 1	1	Iron Hill North1	500
2479	Mount Gibson	Mount Gibson Range vegetation complexes (banded ironstone formation)	Priority 1	1	Iron Hill North2	500
2621	Mount Gibson	Mount Gibson Range vegetation complexes (banded ironstone formation)	Priority 1	1	Iron Hill South	750
3437	Granite pool invertebrate assemblages	Granite outcrop pools with endemic aquatic fauna	Priority 2	1	Wannara_Rock	750
2617	Warriedar Hill/Pinyalling	Warriedar Hill/Pinyalling vegetation complexes (banded ironstone formation)	Priority 1	1	Warriedar	22500
2591	Yalgoo BIF	Yalgoo vegetation complexes (banded ironstone formation)	Priority 1	1	Yalgoo 1	13000

2590	Yalgoo BIF	Yalgoo vegetation complexes (banded ironstone formation)	Priority 1	1	Yalgoo 2	22500
3387	Wagga Wagga and Yalgoo Calcrete	Wagga Wagga and Yalgoo calcrete groundwater assemblage type on Yalgoo palaeodrainage on Wagga Wagga Station and Moore Palaeodrainage on Yoweragabbie Station	Priority 1	1	Yalgoo_calcrete	24000
2623	Mount Gibson	Mount Gibson Range vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Gibson	1500
2623	Mount Gibson	Mount Gibson Range vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Gibson South	1500
2596	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 1	2500
3496	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 10	14000
3497	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 11	500
3498	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 12	1000
3496	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 13	14000
3500	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 14	500

3501	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 15	700
3502	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 16	900
3503	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 17	1700
3504	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 18	1400
3505	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 19	15000
2597	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 2	500
2588	Wolla Wolla/Gullewa	Wolla Wolla (Gullewa) vegetation complexes (banded ironstone formation)	Priority 1	1	Gullewa/Wolla Wolla	25000
3505	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 20	15000
3507	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 21	500

3508	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 22	500
3509	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 23	500
3510	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 24	700
3511	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 25	500
3512	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 26	500
3513	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 27	500
3624	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 28	600
3515	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 29	18000
2596	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 3	2500

3516	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 30	500
3518	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 31	600
3519	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 32	500
3520	Mount Karara/Mugada Ridge/Blue Hills	Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Karara/Mungada 33	500
2706	Badja Calcrete	Badja calcrete groundwater assemblage type on Moore palaeodrainage on Badja Station	Priority 1	1	Badja	2500



APPENDIX 5: GPS LOCATIONS OF CONFIRMED PRIORITY FLORA

APPENDIX 5 – GPS LOCATIONS OF CONFIRMED PRIORITY FLORA

NOVEMBER 2011 FLORISTIC SURVEY- PRIORITY FLORA DATA SHEET						
SITE: Austin						
DATE	SPECIES	Conservation code	NORTHING	EASTING	WAYPOINT	POPULATION SIZE
17/11/2011	Drummondita fulva	3	491879.1467	6815519.342	AU01-1	100+
			491684.9417	6815906.409	AU01-4	100+
			491843.285	6815719.732	AU01-3	100+
			491872.7316	6815621.041	AU01-2	100+
17/11/2011	Grevillea globosa	3	492358.8574	6815644.526	AU03-1	3
			492275.6314	6815751.935	AU03-2	2
			492199.6465	6815829.214	AU03-3	4
			492275.1011	6815962.21	AU03-4	3
			492175.7904	6816035.707	AU03-5	20
17/11/2011	Micromyrtis trugenii	3	491759.9345	6815719.895	AU05-1	10
			491702.969	6815810.479	AU05-2	100+
SITE: Highland Chief						
DATE	SPECIES	Conservation code	NORTHING	EASTING	WAYPOINT	POPULATION SIZE
14/11/2011	Grevillea subtiliflora	3	496233.6055	6773155.16	HC04-1	2
			496935.0749	6773590.791	HC04-2	1
			497046.1308	6773576.75	HC04-3	6
			497095.1432	6773570.115	HC04-4	5
			497158.6412	6773578.44	HC04-5	4
			497181.3972	6773574.125	HC04-6	20
			497288.7329	6773253.18	HC04-7	1
			497252.4846	6773159.439	HC04-8	3
			497192.5169	6773435.967	HC04-9	20
			496311.7911	6773442.143	HC04-10	4
			496358.0154	6773639.925	HC04-11	1
14/11/2011	Acacia diallaga	2	496210.7522	6773160.803	HC05-1	4

APPENDIX 5 – GPS LOCATIONS OF CONFIRMED PRIORITY FLORA

			496835.4969	6773592.869	HC05-2	20
			497256.5307	6773317.654	HC05-3	3
			496348.7911	6773596.602	HC05-4	10
			496349.0715	6773632.167	HC05-5	1
			496373.2741	6773667.296	HC05-6	2
			496403.6221	6773642.377	HC05-7	18
SITE: Windinne Well						
DATE	SPECIES	Conservation Code	NORTHING	EASTING	WAYPOINT	POPULATION SIZE
13/11/2011	Drummondita fulva	3	493658.2106	6806346.26	WW10-2	100
			493570.049	6806350.754	WW10-3	1
			493894.7112	6805584.045	WW10-1	understorey dominant
13/11/2011	Micromyrtis trudgenii	3	493841.7473	6805609.277	WW14-1	100+
			493924.8024	6805661.614	WW14-2	20+
					WW14-2	3
			493845.2003	6805717.52	WW14-3	20
			493923.6793	6805757.778	WW14-4	100
			494020.738	6806076.681	WW14-5	20
			494028.4846	6805994.147	WW14-6	20
			494015.536	6805952.926	WW14-7	20
			493891.5384	6806422.055	WW14-8	6
			493832.573	6806355.882	WW14-9	2
			493822.356	6806313.444	WW14-10	2
			493673.2347	6806513.892	WW14-11	100
			493633.8245	6806534.035	WW14-12	10
			493591.7336	6806639.926	WW14-13	100
			493826	6805822	WW01-1	4
493211.2565	6806704.521	WW14-14	50			
493409.6916	6806579.554	WW14-15	20			

APPENDIX 5 – GPS LOCATIONS OF CONFIRMED PRIORITY FLORA

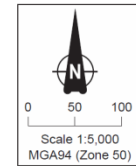
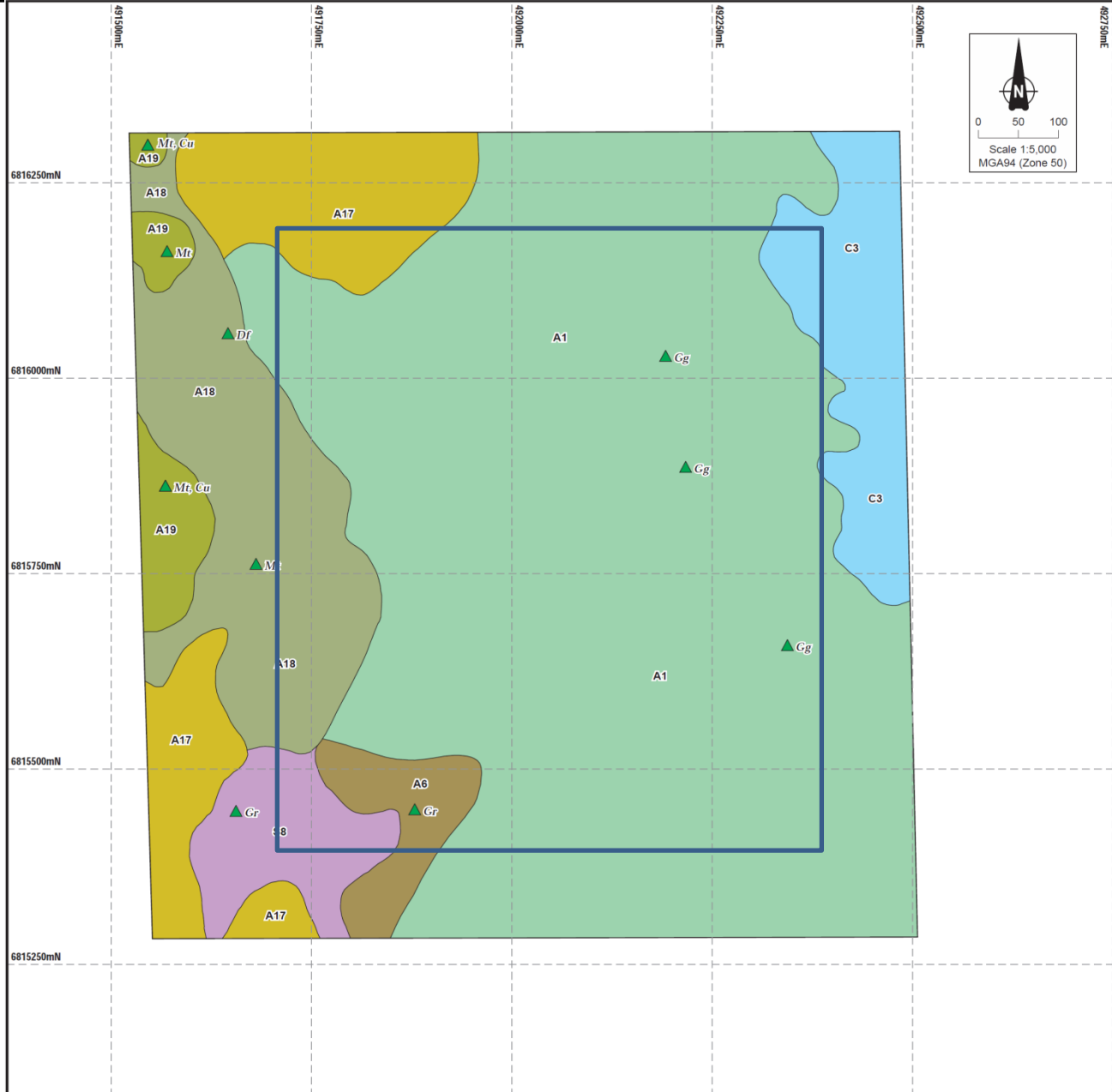
			493320.6548	6806576.623	WW14-16	30
			493218.4634	6806555.07	WW14-17	10
			493221.204	6806538.01	WW14-18	10
			493292.1468	6806462.382	WW14-19	30
SITE: Silverstone						
DATE	SPECIES	Conservation code	NORTHING	EASTING	WAYPOINT	POPULATION SIZE
11/11/2011	Grevillea globosa	3	494969.2159	6801794.778	SS4	10
15/11/2011			495919.1696	6803768.098	SS6-1	5
			495893.8261	6803750.363	SS6-2	3
			495910.4965	6803755.908	SS6-3	2
			495699.6879	6803011.103	SS6-4	1
			495855.7066	6802927.07	SS6-5	4
			495807.2016	6802800.198	SS6-6	5
			495694.6298	6802456.708	SS6-7	20
			495801.4197	6802345.847	SS6-8	50
			495483.9485	6801981.671	SS6-9	1
			495531.7724	6801835.336	SS6-10	5
			495599.7157	6801841.345	SS6-11	2
			495684.5229	6801849.465	SS6-12	2
			495669.2917	6801652.918	SS6-13	2
			495732.0156	6801535.614	SS6-14	1
			495685.9069	6801536.816	SS6-15	4
			495367.6524	6801489.164	SS6-16	1
			495382.8992	6801389.459	SS6-17	100+
			495722.1596	6801300.847	SS6-18	1
			495475.9336	6801289.231	SS6-20	10
SITE: Bugeye						
DATE	SPECIES	Conservation Code	NORTHING	EASTING	WAYPOINT	POPULATION SIZE

APPENDIX 5 – GPS LOCATIONS OF CONFIRMED PRIORITY FLORA

16/11/2011	Micromyrtus trudgenii (P3)	3	495852.2586	6792727.687	BE06-1	100+
			496252.6541	6793750.427	BE06-2	20
			495641.4837	6793983.76	BE06-3	100+
			495782.4375	6794005.639	BE06-4 was recorded as BE0-4 on gps	100
			495702.285	6793686.974	BE06-5	50
			495703.3015	6793312.278	BE06-6	50
10/11/2011	Grevillea scabrida	3	495967.008	6793269.275	BE02	2
16/11/11	Drummondita fulva	3	495851.3817	6792728.13	BE07-1	100+
			495693.0055	6794014.801	BE07-2	20+
			496219.0796	6793647.935	BE07-3	2
			495702.1877	6793686.42	BE07-4	50
			495703.3013	6793312.832	BE07-5	50



**APPENDIX 6 – VEGETATION COMMUNITY MAPS
(FIGURES 4.1-4.5)**



PRIORITY SPECIES

- Cu *Calytrix uncinata*
- Df *Drummondia fulva*
- Gg *Grevillea globosa*
- Gr *Gunniopsis rubra*
- Mt *Micromyrtus trudgenii*

RARE AND PRIORITY SPECIES

Priority	DEC	Herbarium	EMM	WEC	TEC
Rare	●	■	▲	▼	★
1	●	■	▲	▼	
2	●	■	▲	▼	
3	●	■	▲	▼	
4	●	■	▲	▼	

LEGEND

- C3 Low Open Woodland of *Callitris columellaris* over *Acacia ayersiana* and *Acacia ramulosa* var. *ramulosa* over *Ptilotus* spp., *Olearia* spp. and mixed low shrubs over *Goodenia* spp. on orange-red sandy-loam flats.
- A1 Tall Open Scrub of *Acacia ramulosa* var. *ramulosa* with *Acacia sibina* over *Eremophila forrestii* and mixed low shrubs over annuals on orange sandy loams on lower slopes and flats.
- A6 Tall Open Scrub of *Acacia ramulosa* var. *ramulosa* with *Acacia burkittii*, *Acacia tetragonophylla* and *Grevillea obliquistigma* subsp. *obliquistigma* over *Philothea brucei* subsp. *brucei* and *Scaevola spinescens* over annuals on orange brown sandy loam with rock cover on flats.
- A17 Tall Open Shrubland of *Acacia ramulosa* var. *ramulosa* with *Acacia tetragonophylla* and *Acacia exocarpoides* over *Eremophila clarkii* and *Philothea brucei* subsp. *brucei* over mixed low shrubs and annuals with occasional emergent *Eucalyptus horistes* on rocky orange-brown clayey-loam flats.
- A18 Tall Open Shrubland of *Acacia ramulosa* var. *ramulosa* and *Acacia effusifolia* over *Philothea brucei* subsp. *brucei*, *Grevillea obliquistigma* subsp. *obliquistigma* and *Aluta aspera* subsp. *hesperia* over mixed low shrubs over annuals, with emergent *Acacia aneura* var. *aneura* on orange-brown rocky slopes with occasional ironstone pebbles.
- A19 Open Shrubland of *Acacia assimilis* subsp. *assimilis* over *Thryptomene costata* and *Thryptomene decussata* with *Micromyrtus trudgenii* and *Calytrix uncinata* over *Ptilotus* spp. and mixed low shrubs over *Stylidium longibracteatum* and annuals on rocky shale upper-slopes and ridges with occasional shale outcropping.
- S8 Open Shrubland of *Thryptomene costata* with occasional emergent *Acacia* spp., *Thryptomene decussata* and *Philothea brucei* subsp. *brucei* over *Ptilotus schwartzii* and mixed low shrubs over annuals on red-brown slightly rocky clay flats with quartz and occasional ironstone pebbles.
- CL Cleared.

Auth: M.Adam

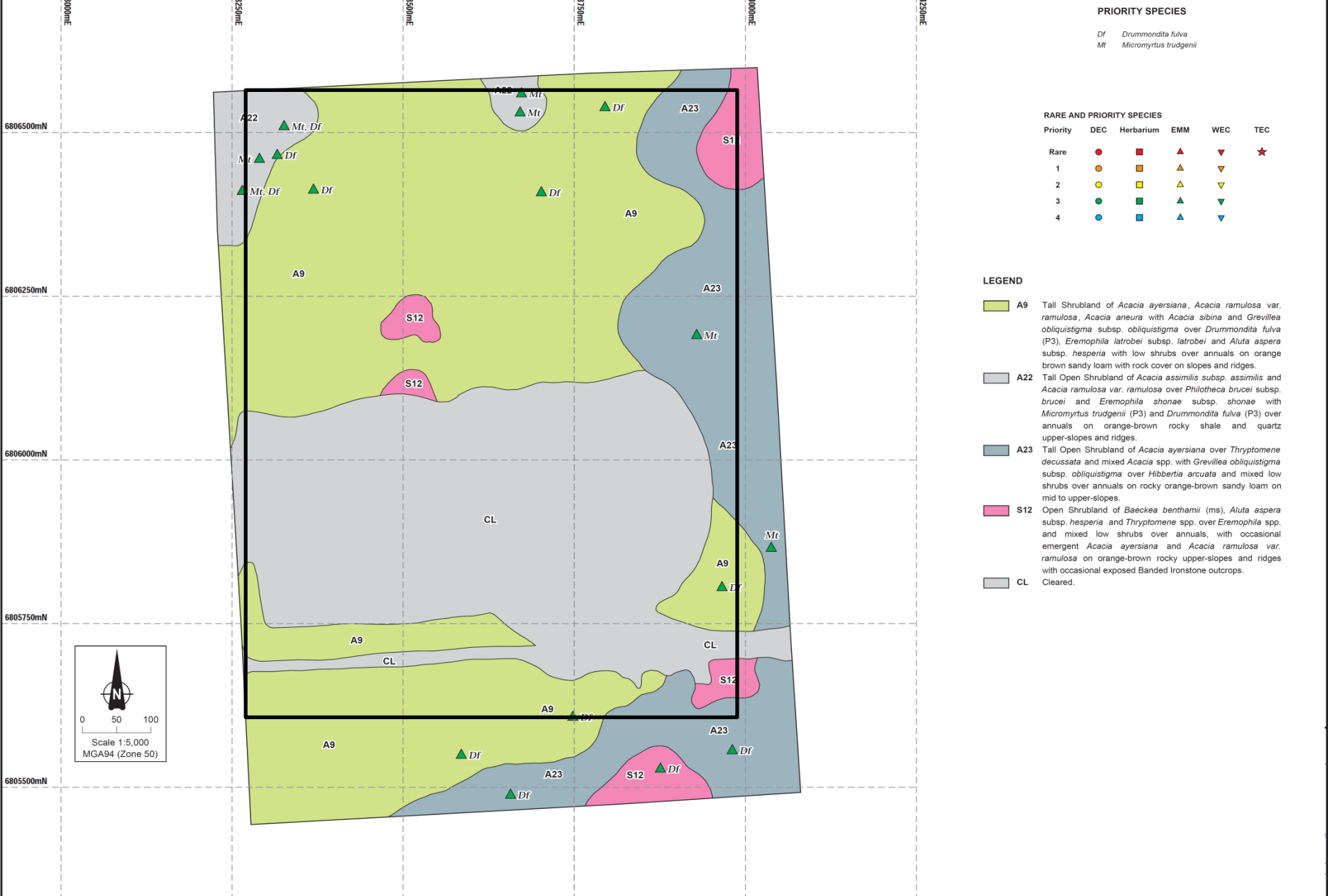
Project: Minjar Gold Pty Ltd

Date: Novemeber 2011

Datum: GDA94
MGA (Zone 50)



Figure 4.1
Austin Vegetation Community Map



PRIORITY SPECIES

Df *Drummondita fulva*
 Mt *Micromyrtus trudgenii*

RARE AND PRIORITY SPECIES

Priority	DEC	Herbarium	EMM	WEC	TEC
Rare	●	■	▲	▼	★
1	●	■	▲	▼	★
2	●	■	▲	▼	★
3	●	■	▲	▼	★
4	●	■	▲	▼	★

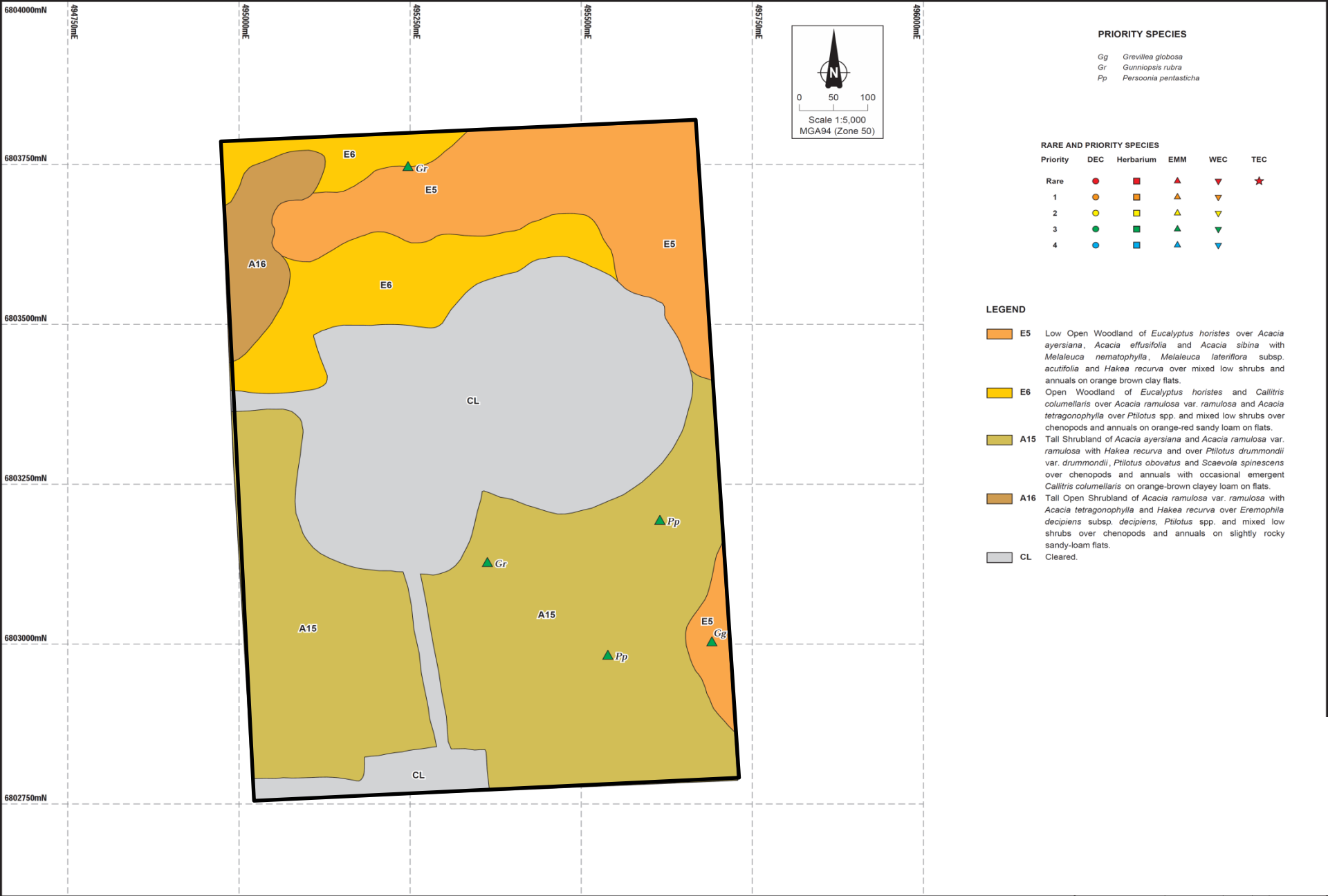
LEGEND

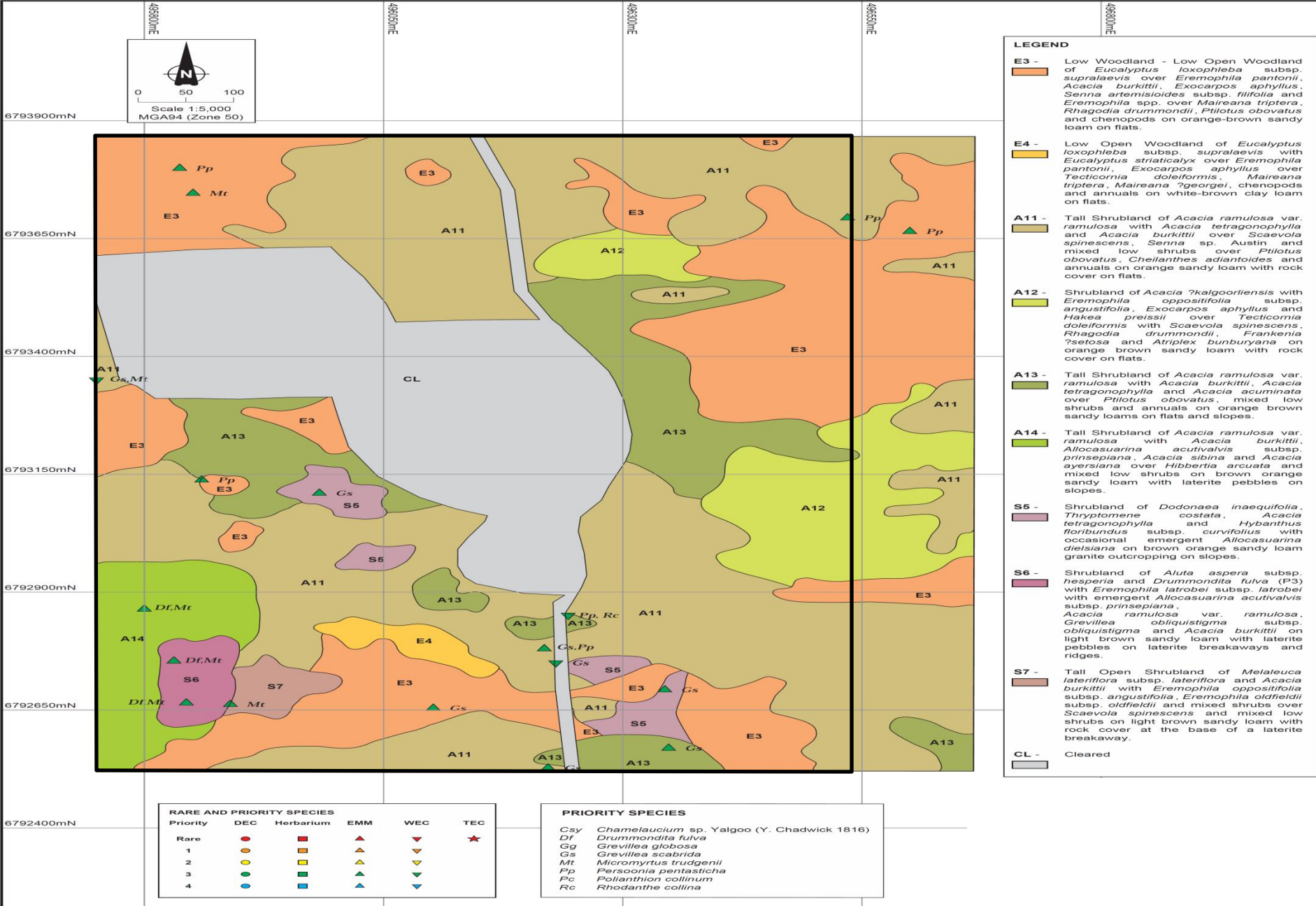
- A9** Tall Shrubland of *Acacia ayersiana*, *Acacia ramulosa* var. *ramulosa*, *Acacia aneura* with *Acacia sibina* and *Grevillea obliquistigma* subsp. *obliquistigma* over *Drummondita fulva* (P3), *Eremophila latrobei* subsp. *latrobei* and *Aluta aspera* subsp. *hesperia* with low shrubs over annuals on orange brown sandy loam with rock cover on slopes and ridges.
- A22** Tall Open Shrubland of *Acacia assimilis* subsp. *assimilis* and *Acacia ramulosa* var. *ramulosa* over *Phyllothea brucei* subsp. *brucei* and *Eremophila shonae* subsp. *shonae* with *Micromyrtus trudgenii* (P3) and *Drummondita fulva* (P3) over annuals on orange-brown rocky shale and quartz upper-slopes and ridges.
- A23** Tall Open Shrubland of *Acacia ayersiana* over *Thryptomene decussata* and mixed *Acacia* spp. with *Grevillea obliquistigma* subsp. *obliquistigma* over *Hibbertia arcuata* and mixed low shrubs over annuals on rocky orange-brown sandy loam on mid to upper-slopes.
- S12** Open Shrubland of *Baeckea bentharii* (ms), *Aluta aspera* subsp. *hesperia* and *Thryptomene* spp. over *Eremophila* spp. and mixed low shrubs over annuals, with occasional emergent *Acacia ayersiana* and *Acacia ramulosa* var. *ramulosa* on orange-brown rocky upper-slopes and ridges with occasional exposed Banded Ironstone outcrops.
- CL** Cleared.

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Date: Novemeber 2011	Datum: GDA94 MGA (Zone 50)



Figure 4.2
Windinnie Well Vegetation Community Map





- LEGEND**
- E3** - Low Woodland - Low Open Woodland of *Eucalyptus loxophleba* subsp. *supralaevis* over *Eremophila pantonii*, *Acacia burkittii*, *Exocarpos aphyllus*, *Senna artemisioides* subsp. *filifolia* and *Eremophila* spp. over *Maireana triptera*, *Rhagodia graminifolia*, *Ptilotus obovatus* and chenopods on orange-brown sandy loam on flats.
 - E4** - Low Open Woodland of *Eucalyptus loxophleba* subsp. *supralaevis* with *Eucalyptus striatocalyx* over *Eremophila pantonii*, *Exocarpos aphyllus* over *Tecticornia dolioformis*, *Maireana triptera*, *Maireana ?georgei*, chenopods and annuals on white-brown clay loam on flats.
 - A11** - Tall Shrubland of *Acacia ramulosa* var. *ramulosa* with *Acacia tetragonophylla* and *Acacia burkittii* over *Scaevola spinescens*, *Senna* sp. Austin and mixed low shrubs over *Ptilotus obovatus*, *Chellanthus adiantoides* and annuals on orange sandy loam with rock cover on flats.
 - A12** - Shrubland of *Acacia ?kalgoorilensis* with *Eremophila oppositifolia* subsp. *angustifolia*, *Exocarpos aphyllus* and *Hakea preissii* over *Tecticornia dolioformis* with *Scaevola spinescens*, *Rhagodia drummondii*, *Frankenia ?setosa* and *Atriplex bunburyana* on orange brown sandy loam with rock cover on flats.
 - A13** - Tall Shrubland of *Acacia ramulosa* var. *ramulosa* with *Acacia burkittii*, *Acacia tetragonophylla* and *Acacia acuminata* over *Ptilotus obovatus*, mixed low shrubs and annuals on orange brown sandy loams on flats and slopes.
 - A14** - Tall Shrubland of *Acacia ramulosa* var. *ramulosa* with *Acacia burkittii*, *Allocasuarina acutivalvis* subsp. *princeplana*, *Acacia sibirica* and *Acacia ayersiana* over *Hibbertia arcuata* and mixed low shrubs on brown orange sandy loam with laterite pebbles on slopes.
 - S5** - Shrubland of *Dodonaea inaequifolia*, *Tryptomena costata*, *Acacia tetragonophylla* and *Hybanthus floribundus* subsp. *curvifolius* with occasional emergent *Allocasuarina dieisiana* on brown orange sandy loam granite outcropping on slopes.
 - S6** - Shrubland of *Aluta aspera* subsp. *hesperia* and *Drummondita fulva* (P3) with emergent *Eremophila latrobei* subsp. *latrobei* with emergent *Allocasuarina acutivalvis* subsp. *princeplana*, *Acacia ramulosa* var. *ramulosa*, *Acacia obliquistigma* subsp. *obliquistigma* and *Acacia burkittii* on light brown sandy loam with laterite pebbles on laterite breakaways and ridges.
 - S7** - Tall Open Shrubland of *Melaleuca lateriflora* subsp. *lateriflora* and *Acacia burkittii* with *Eremophila oppositifolia* subsp. *angustifolia*, *Eremophila oldfieldii* subsp. *oldfieldii* and mixed shrubs over *Scaevola spinescens* and mixed low shrubs on light brown sandy loam with rock cover at the base of a laterite breakaway.
 - CL** - Cleared

RARE AND PRIORITY SPECIES

Priority	DEC	Herbarium	EMM	WEC	TEC
Rare	●	■	▲	▼	★
1	●	■	▲	▼	★
2	●	■	▲	▼	★
3	●	■	▲	▼	★
4	●	■	▲	▼	★

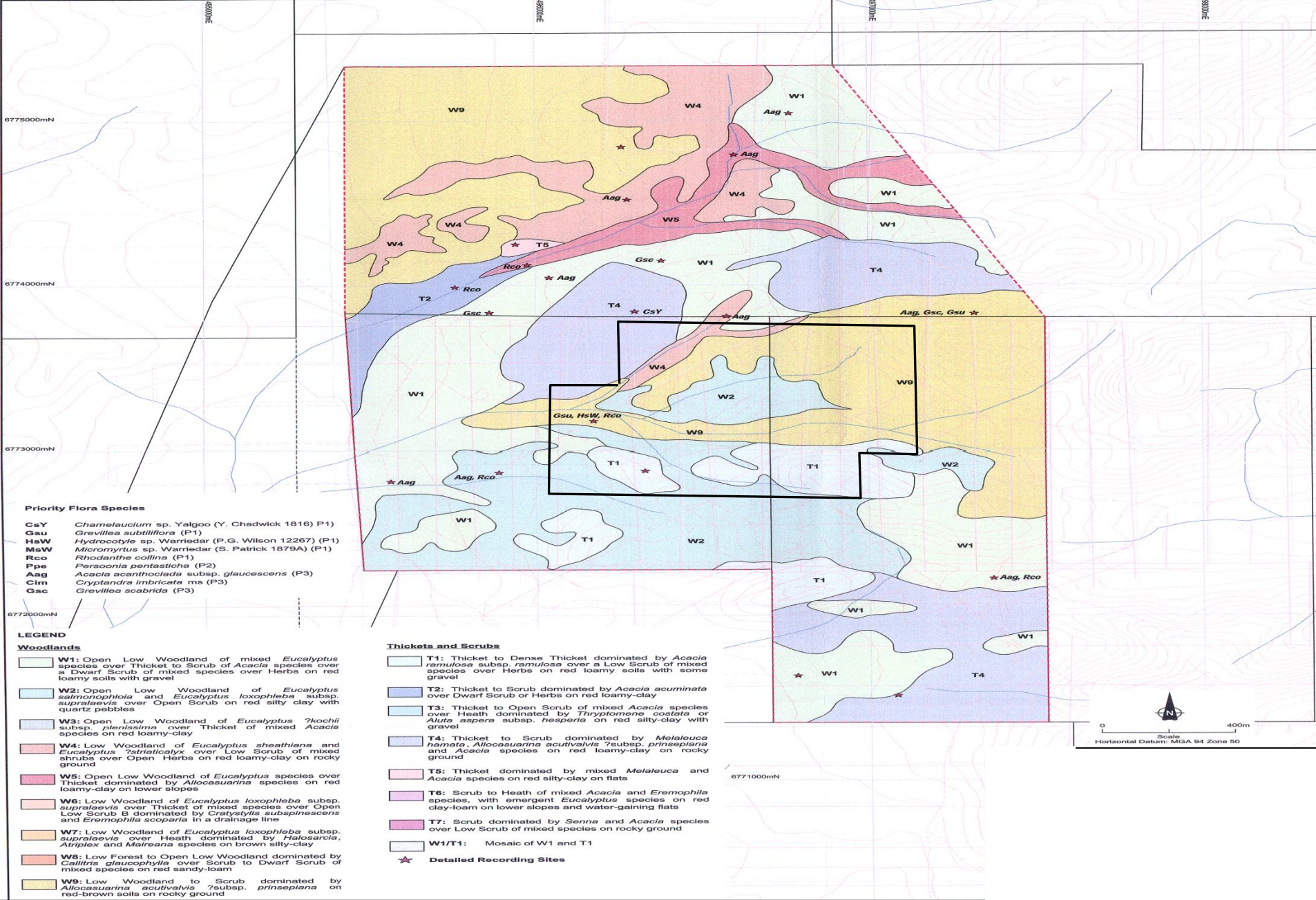
PRIORITY SPECIES

<i>Csy</i>	<i>Chamaelaucium</i> sp. Yalgoo (Y. Chadwick 1816)
<i>Df</i>	<i>Drummondita fulva</i>
<i>Gg</i>	<i>Grevillea globosa</i>
<i>Gs</i>	<i>Grevillea scabrata</i>
<i>Mt</i>	<i>Micromyrtus trudgenii</i>
<i>Pp</i>	<i>Persoonia pentasticha</i>
<i>Pc</i>	<i>Polyanthus collinum</i>
<i>Rc</i>	<i>Rhodanthe collina</i>

Auth: M.Adam
 Project: Minjar Gold Pty Ltd
 Date: Novemeber 2011
 Datum: GDA94
 MGA (Zone 50)



Figure 4.4
Bugeye Vegetation Community Map



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 Date: Novemeber 2011
 Project: Minjar Gold Pty Ltd
 Datum: GDA94
 MGA (Zone 50)



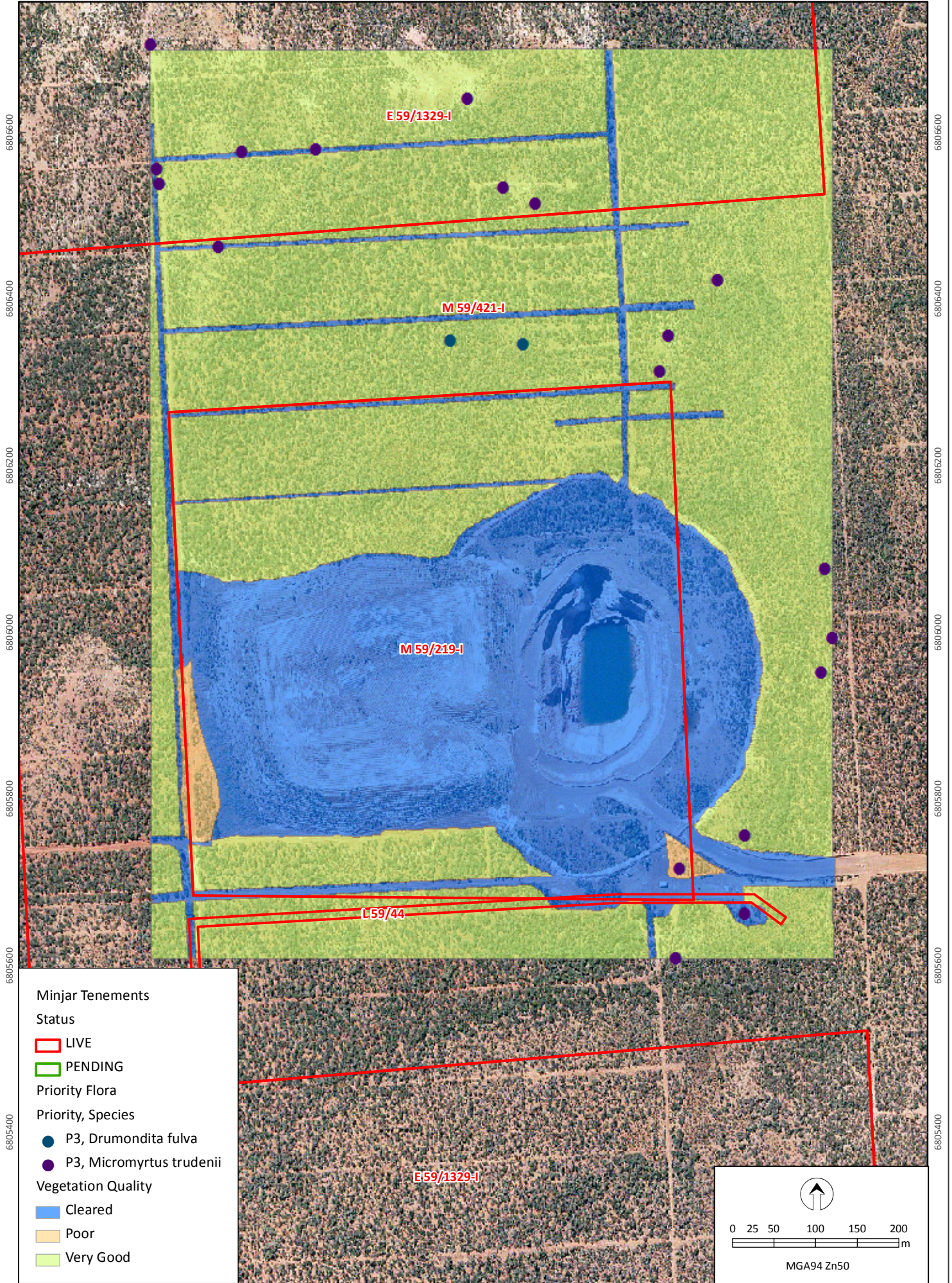
Figure 4.5
 Highland Chief Vegetation Community Map

**APPENDIX 7 – VEGETATION CONDITION MAPS
(FIGURES 5.1-5.5)**

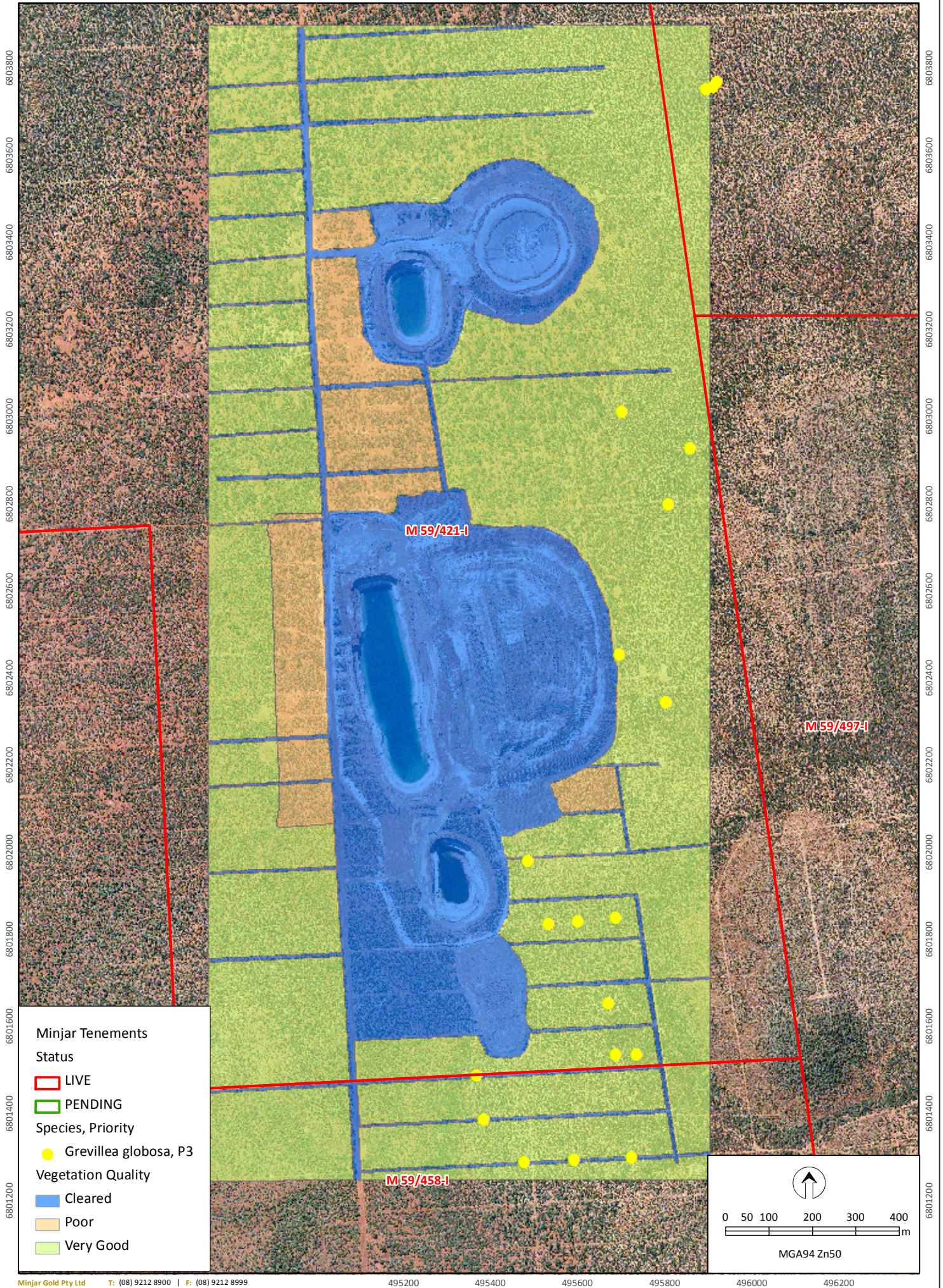
Minjar Gold Project - Austin Vegetation and Flora Survey - December 2011



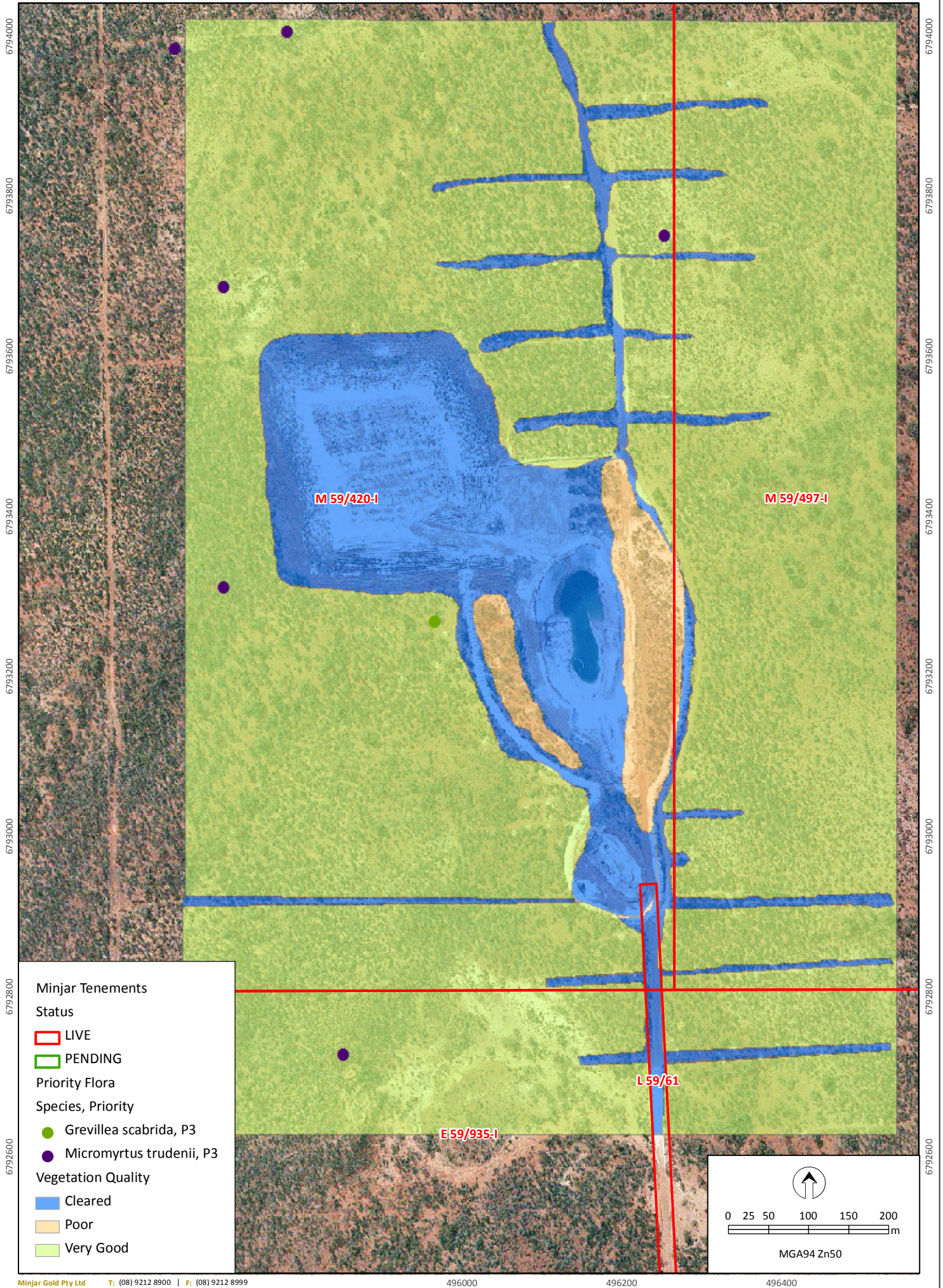
Minjar Gold Project - Windinne Well Vegetation and Flora Survey - December 2011



Minjar Gold Project - Silverstone Vegetation and Flora Survey - December 2011



Minjar Gold Project - Bugeye Vegetation and Flora Survey - December 2011



Minjar Tenements

Status

- LIVE
- PENDING

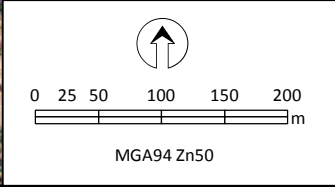
Priority Flora

Species, Priority

- Grevillea scabrada, P3
- Micromyrtus trudenii, P3

Vegetation Quality

- Cleared
- Poor
- Very Good



0 25 50 100 150 200
m

MGA94 Zn50

Minjar Gold Project - Highland Chief Vegetation and Flora Survey - December 2011

