MWH now part of Stantec

REPORT

GNAWEEDA LEVEL 2 FLORA AND VEGETATION ASSESSMENT

Prepared for Doray Minerals Limited

March 2017

MWH Australia Pty Ltd undertook the work, and prepared this document, in accordance with specific instructions from Doray Minerals Limited to whom this document is addressed, within the time and budgetary requirements of Doray Minerals Limited. The conclusions and recommendations stated in this document are based on those instructions and requirements, and they could change if such instructions and requirements change or are in fact inaccurate or incomplete.

MWH Australia Pty Ltd has prepared this document using data and information supplied to MWH Australia Pty Ltd, Doray Minerals Limited and other individuals and organisations, most of whom are referred to in this document. Where possible, throughout the document the source of data used has been identified. Unless stated otherwise, MWH Australia Pty Ltd has not verified such data and information. MWH Australia Pty Ltd does not represent such data and information as true or accurate, and disclaims all liability with respect to the use of such data and information. All parties relying on this document, do so entirely at their own risk in the knowledge that the document was prepared using information that MWH Australia Pty Ltd has not verified.

This document is intended to be read in its entirety, and sections or parts of the document should therefore not be read and relied on out of context.

The conclusions and recommendations contained in this document reflect the professional opinion of MWH Australia Pty Ltd, using the data and information supplied. MWH Australia Pty Ltd has used reasonable care and professional judgment in its interpretation and analysis of the data. The conclusions and recommendations must be considered within the agreed scope of work, and the methodology used to carry out the work, both of which are stated in this document.

This document was intended for the sole use Doray Minerals Limited and only for the use for which it was prepared, which is stated in this document. Any representation in the document is made only to Doray Minerals Limited. MWH Australia Pty Ltd disclaims all liability with respect to the use of this document by any third party, and with respect to the use of and reliance upon this document by any party, including Doray Minerals Limited for a purpose other than the purpose for which it was prepared.

MWH Australia Pty Ltd has conducted environmental field monitoring and/or testing for the purposes of preparing this document. The type and extent of monitoring and/or testing is described in the document.

Subject to the limitations imposed by the instructions and requirements of Doray Minerals Limited, the monitoring and testing have been undertaken in a professional manner, according to generally-accepted practices and with a degree of skill and care which is ordinarily exercised by reputable environmental consultants in similar circumstances. MWH Australia Pty Ltd makes no other warranty, express or implied.

Maps produced by MWH Australia Pty Ltd may be compiled from multiple external sources and therefore MWH Australia Pty Ltd does not warrant that the maps provided are error free. MWH Australia Pty Ltd does not purport to represent precise locations of cadastral corners or the surveyed dimensions of cadastral boundaries. MWH Australia Pty Ltd gives no warranty in relation to mapping data (including accuracy, reliability, completeness or suitability) and accepts no liability for any loss, damage or costs relating to any use of the data.

QUALITY STATEMENT

PERTH
41 Bishop Street, Jolimont , WA 6014
TEL +61 (08) 9388 8799, FAX +61 (08) 9388 8633

REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
v1.0	24/1/17	Draft Report for Comment	MS & CvdB	CvdB	PB	PB
V2.0	22/2/17	Draft Revision	MS & CvdB	MS	PB	PB
V3.0	03/03/17	Final	MS	MS	MS	PB

Executive Summary

This report presents botanical work undertaken by MWH Global for Doray Minerals Limited. The work comprised a level 2 flora and vegetation assessment of the Gnaweeda Project in the Murchison region of Western Australia. Specifically, Doray is exploring the Gnaweeda Project for gold mineralisation that could potentially be treated at the Andy Well gold processing facility.

The purpose of the work was to identify the floristic values of the Gnaweeda Project, including a proposed mine area and associated haul road, to assist in determining potential impacts to flora and vegetation associated with implementation of the Gnaweeda Project. The Study Area, comprising both the mine and haul road survey boundaries covers approximately 2,369 ha.

A desktop assessment was undertaken prior to the field survey comprising database searches and a literature review to compile relevant background information. A total of 65 conservation significant flora taxa were identified. Of these only two were considered likely to occur and 13 were considered to possibly occur.

The field survey was undertaken over seven days, from 12 to 18 October 2016, with supplementary survey effort during the fauna survey over four days from 21 to 24 November 2016. A total of 77 flora sites, comprising 63 quadrats and 14 relevés were established. Targeted searches focused on habitat likely to support priority flora taxa known to occur within the Study Area, and in the supplementary survey focus was on locations where Priority flora specimens were collected during the initial survey and any analogous habitat within the Study Area. Vegetation units were identified based on field observations and statistical analysis of flora data, and described using the National Vegetation Information System, based on their structure and composition.

A total of 151 vascular flora taxa were recorded within the Study Area, comprising only native flora taxa. No threatened flora taxa were recorded from the Study Area during the field survey. Two priority flora taxa, *Stenanthemum mediale* (P1) and *Gunniopsis propinqua* (P3) were recorded from the Study Area, both within the proposed haul road survey area. No priority flora taxa were recorded from the proposed mine area.

Eighteen vegetation units were identified within the Study Area. No Threatened Ecological Communities or Priority Ecological Communities were recorded within the Study Area. Five vegetation units within the Study Area were considered to be of local significance, for supporting Priority Flora taxa. No groundwater dependant vegetation was recorded within the Study Area.

Vegetation condition ranged from Very Good to Completely Degraded, with the majority considered to be in Good condition. Disturbances observed were associated with pastoral activities, and mineral projects and exploration.

Doray Minerals Limited

Gnaweeda Level 2 Flora and Vegetation Assessment

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

APPENDICES

1 Introduction

1.1 Background and Location

Doray Minerals Limited (Doray) is evaluating the potential development of the Gnaweeda Project (the Project) to operate as a satellite pit to their existing operations at the Andy Well mine site (Andy Well). The Project is located approximately 40 kilometres (km) northeast of Meekatharra and approximately 15 km southeast of the existing Andy Well operations in the northern Murchison region of Western Australia (**Figure 1-1**).

The Project comprises the proposed mine site and associated haul road corridor to transport ore to the mill at Andy Well (**Figure 1-2**). Doray commissioned MWH Australia Pty Ltd (MWH) to complete a Level 2 flora and vegetation assessment of the Study Area to inform the Environmental Impact Assessment (EIA) process and assist in meeting the requirements for regulatory assessment. Two areas were assessed during the flora and vegetation survey:

- The **mine survey area**: approximately 1,799 hectare (ha) parcel of land that encompasses the proposed pit and associated infrastructure;
- The **haul road survey Area**: approximately 570 ha corridor that is 500 metres (m) in width and approximately 11 km in length extending from the northern boundary of the mine survey area to the edge of the Andy Well mining lease.

Together, the mine and haul road survey boundaries are hereafter referred to as the 'Study Area' and equate to approximately 2,369 ha in total (**Figure 1-2**).

1.2 Scope and Objectives

A level 2 survey, incorporating a desktop study and detailed field survey, was required for the Gnaweeda Project due to the potential for restricted landforms or vegetation units, conservation significant species or communities, and based on the scale and nature of potential impacts (**Appendix A**). The overarching aim of the level 2 flora and vegetation assessment was to identify the environmental values of the Gnaweeda Project to assist in assessing potential impacts of project implementation on flora and vegetation. The specific objectives were to:

- Complete a desktop review of relevant literature and databases for the Study Area;
- Describe vegetation units and their condition by means of a detailed field survey; and
- Delineate and map vegetation units and their condition, in the Study Area.

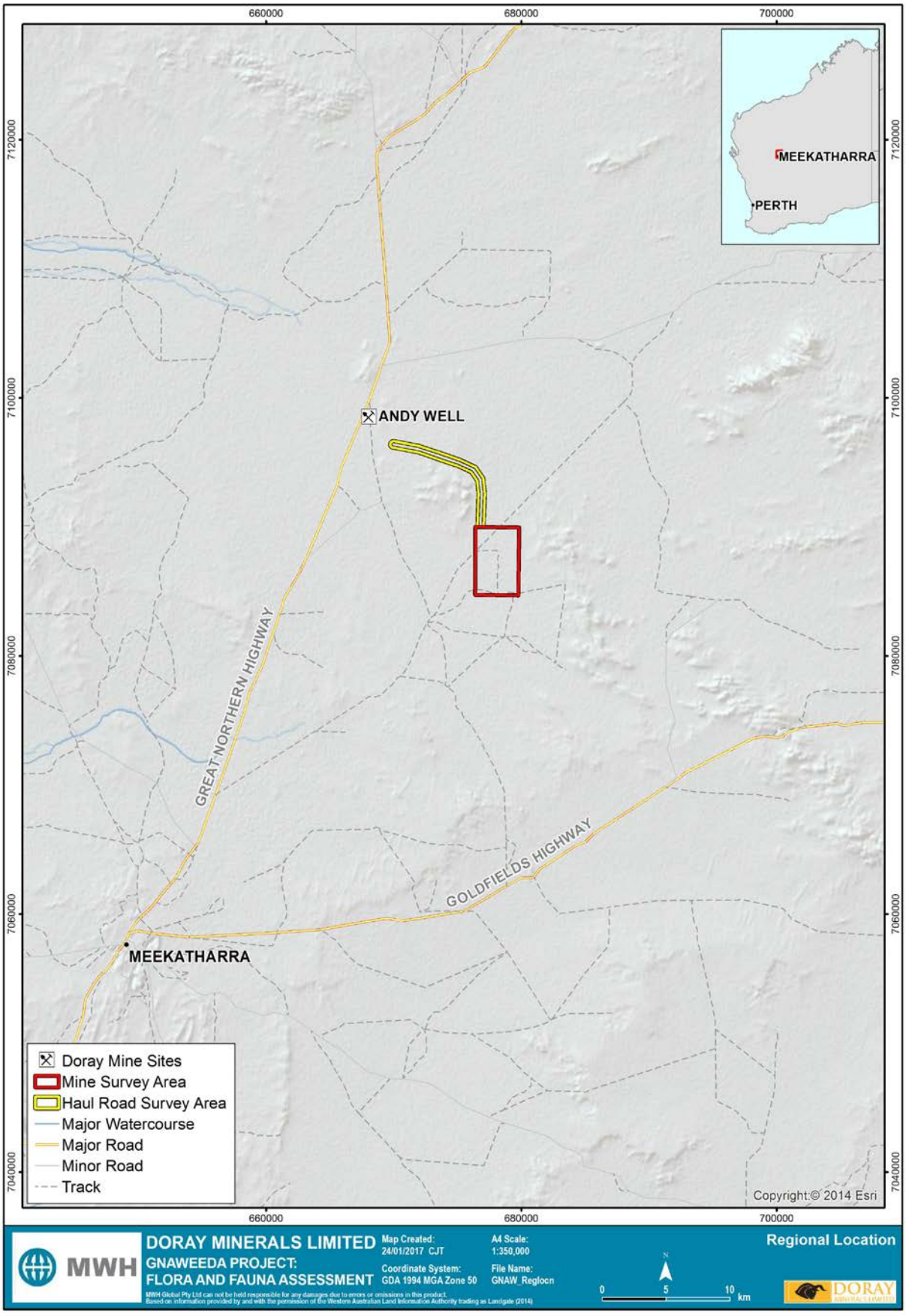


Figure 1-1: Regional Location of the Project

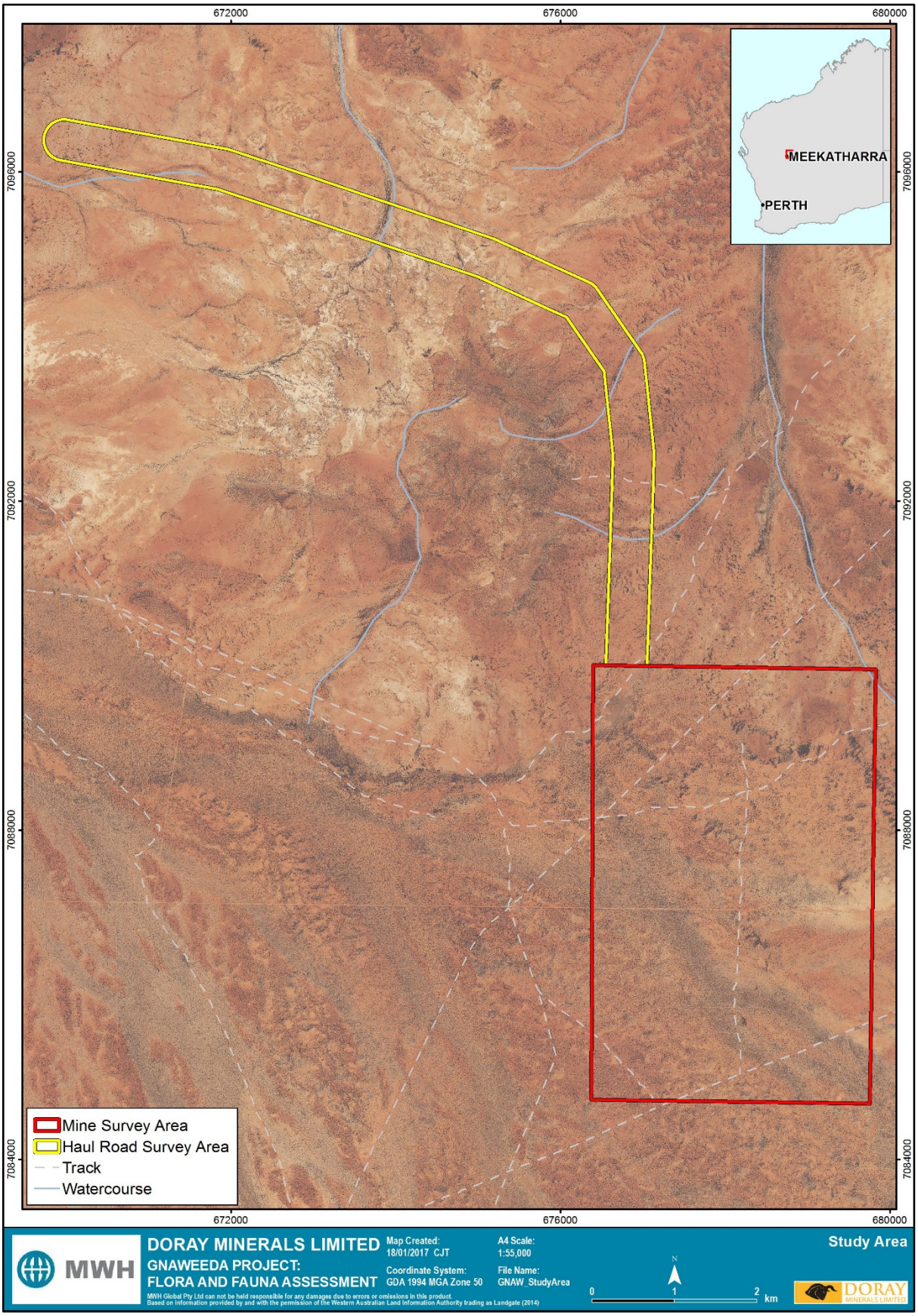


Figure 1-2: Gnaweeda Study Area

2 Legislative Context

The flora and vegetation assessment was undertaken in accordance with the requirements of the following key legislation and regulations:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth).
- *Environmental Protection Act 1986* (EP Act) (WA).
- *Biodiversity Conservation Act 2016* (BC Act) (WA).
- *Wildlife Conservation Act 1950* (WC Act) (WA).
- *Biosecurity and Agriculture Management Act 2007* (BAM Act) (WA).

2.1 Federal Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the key Commonwealth environmental legislation that protects and manages matters of national and international environmental significance. The administering agency for this act is the Commonwealth Department of the Environment and Energy (DOTEE). The nine Matters of National Environmental Significance (MNES) addressed under the Act are:

- World Heritage sites.
- National Heritage places.
- Wetlands of international importance (i.e. Ramsar listed wetlands).
- Nationally Threatened species and ecological communities.
- Migratory species (protected under international agreements).
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions.
- A water resource, in relation to coal seam gas development and large coal mining development.

The key MNES relevant to this survey is nationally threatened species and ecological communities.

2.2 State Legislation

2.2.1 Environmental Protection Act 1986

The *Environmental Protection Act 1986* (EP Act) is the primary legislation that governs environmental impact assessment (EIA) and protection in Western Australia. The aim of the Act is:

"to provide for an Environmental Protection Authority, for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with foregoing".

In Section 4A of this Act there are five principles, which are necessary for the objectives of the Act to be realised. Three of these principles are applicable to native flora and vegetation:

- The precautionary principle.

- The principle of intergenerational equity.
- The principle of the conservation of biological diversity and ecological integrity.

Authorities under this Act include the Department of Environment Regulation (DER), Department of Parks and Wildlife (Parks and Wildlife) (formerly the Department of Environment and Conservation (DEC)) and the Environmental Protection Authority (EPA), including the Office of the Environmental Protection Authority (OEPA).

Part IV of the EP Act relates to the assessment of significant environmental impacts, and Part V deals with licensing and control of pollution from prescribed premises and permits for land clearing.

2.2.2 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) came into force in September 2016 and is an act to provide for:

"the conservation and protection of biodiversity and biodiversity components in Western Australia; the ecologically sustainable use of biodiversity components in Western Australia; the repeal of the *Wildlife Conservation Act 1950* and the *Sandalwood Act 1929*; and consequential amendments to other acts, and for related purposes"

The *Wildlife Conservation Act 1950* and the *Sandalwood Act 1929* are outdated. The Wildlife Act has been in place for 66 years and does not have the features of modern biodiversity conservation legislation. Rather, it has a regulatory-based approach, and does not provide for the promotion or encouragement for biodiversity conservation. The Biodiversity Conservation Act will eventually fully replace both the Wildlife Act and the Sandalwood Act. On 2 December 2016, several parts of the new Act were proclaimed by the State Governor in the Government Gazette.

Provisions that replace those existing under the Wildlife Act (including threatened species listings and controls over the taking of native species) and their associated Regulations cannot be brought into effect until the necessary Biodiversity Conservation Regulations have been made. It is anticipated that the new Regulations will be completed and ready to commence in late 2017.

2.2.3 Wildlife Conservation Act 1950

The Western Australia *Wildlife Conservation Act 1950* (WC Act) is:

"An Act to provide for Conservation and Protection of Wildlife".

Under the Act, all native flora is protected throughout the whole state at all times. In addition the Minister for the Environment can publish a notice in the Government Gazette, declaring a list of flora species that are rare, likely to become extinct or otherwise in need of special protection.

Flora that is declared Threatened (gazetted Declared Rare Flora) is protected and may not be impacted on, unless authorised and carried out in accordance with the terms and conditions of the licences issued under Section 23C. The WC Act also protects fauna species that are rare, likely to become extinct or otherwise in need of special protection.

2.2.4 Biosecurity and Agriculture Management Act 2007

The Western Australian *Biosecurity and Agriculture Management Act 2007* (BAM Act) is:

"An Act to provide for; the control of certain organisms; the use of agricultural and veterinary chemicals; the identification and attainment of standards of quality and safety for agricultural products, animal feeds, fertilisers and other substances and things; the establishment of a Declared Pest Account, a Modified Penalties Revenue Account and accounts for industry funding schemes; and related matters".

The Act is managed by the Department of Agriculture and Food Western Australia (DAFWA) and specifically relates to the prohibition and regulation of the introduction and spread of weeds (introduced species) declared under the Act for the protection of agricultural management.

2.3 Environmental Guidance and Policy

The EPA has produced a number of policy statements, guidelines and technical guides, which provide guidance and advice regarding the EPA's position on the flora and vegetation of Western Australia. Relevant documents include:

- Guidance for the Assessment of Environmental Factors No. 6 Rehabilitation of Terrestrial Ecosystems (EPA 2006).
- Guidance for the Assessment of Environmental Factors No. 51: Terrestrial Flora and Vegetation
- Surveys for Environmental Impact Assessment in Western Australia (EPA 2004).
- Position Statement No. 2 Environmental Protection of Native Vegetation in Western Australia (EPA 2000).
- Position Statement No. 3 Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002).
- Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA and DPaW 2015)
- Environmental Assessment Guideline No. 8: Environmental principles, factors and objectives (EPA 2015)

A new technical guide, Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016), was released in December 2016 following the independent legal and governance review of the EPA and application of its policies and guidelines. The planning and implementation of the botanical work described in this report was undertaken prior to this change and as such follows the guidance of the (EPA and DPaW 2015).

3 Existing Environment

3.1 Climate

The Murchison region is described as an arid climate characterised by summer and winter rainfall with annual totals rarely exceeding 200 millimetres (mm) (Beard 1990, Desmond *et al.* 2001). The climate is typical of a semi-desert tropical climate characterised by hot summers and relatively warm, dry winters (BoM 2016).

Meekatharra Airport (station number 007045), approximately 40 km south west of the Study Area, is the nearest Bureau of Meteorology (BoM) weather station, which documents long term climate data (BoM 2016). The mean annual rainfall recorded at Meekatharra Airport is 239 mm with the majority received between January and March each year, with a secondary peak between May and July. Peak rainfall is recorded in February with a secondary peak in June (BoM 2016) (**Figure 3-1**). The hottest maximum temperatures occur between November and March, with the coldest minimums occurring between May and August (BoM 2016) (**Figure 3-1**).

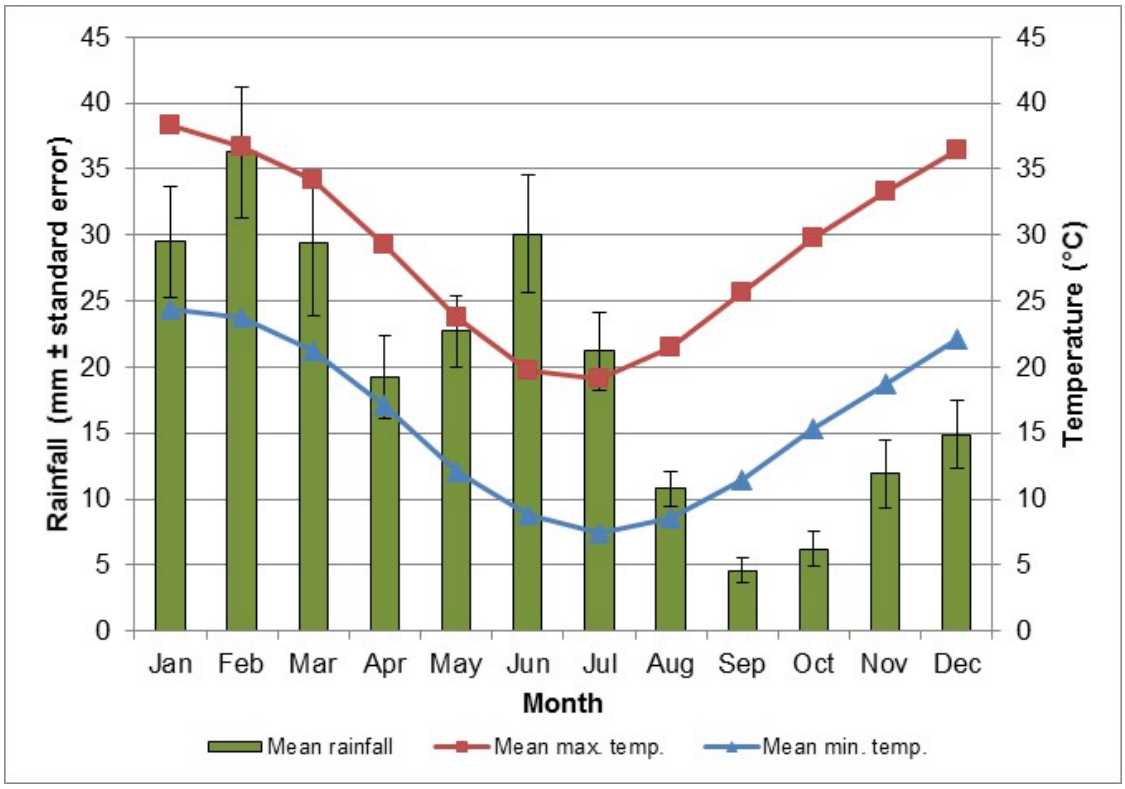


Figure 3-1: Long-term climate data recorded at Meekatharra Airport (BoM 2016)

3.2 Land Use

Pastoral grazing is the primary land use in the Western Murchison subregion, with the remaining land comprising Unallocated Crown Land (UCL) and Crown reserves (Desmond *et al.* 2001). Less than 1% is protected for conservation (Government of Western Australia 2015). Nickel and gold mining also occur in the subregion on pastoral lands that remain stocked (Desmond *et al.* 2001). The Study Area is located on Killara and Yoothapina pastoral leases. Both Killara and Yoothapina are stocked cattle stations.

The Study Area is not located within or immediately adjacent to a National Park or conservation reserve and operations within the Study Area are highly unlikely to impact on any National Parks or conservation reserves. The nearest national parks and conservation reserves are:

- Ex-Mooloogool Pastoral Lease (former leasehold proposed for conservation) – 25 km north-east;
- Ex-Kaluwiri Pastoral Lease (former leasehold proposed for conservation) – 113 km south-east
- Collier Range National Park - 170 km north;
- Wanjarri Nature Reserve - 200 km south east;
- Ex-Lorna Glen Pastoral Lease (former leasehold proposed for conservation) – 224 km east; and
- Mount Augustus National Park - 280 km north west.

3.3 Biogeographic Region

The Interim Biogeographic Regionalisation for Australia (IBRA) is a bioregional framework that divides Australia into 89 bioregions and 419 subregions on the basis of climate, geology, landforms, vegetation and fauna (Thackway and Cresswell 1995). It was developed through collaboration between state and territory conservation agencies with coordination by the Commonwealth Department of the Environment, Water, Heritage and the Arts (now the Commonwealth Department of the Environment and Energy, DOTEE).

The Study Area is wholly located within the Murchison bioregion, which is further subdivided into two subregions, the Western Murchison and Eastern Murchison. The Murchison bioregion comprises low hills and mesas separated by flat colluvium and alluvial plains. The vegetation is dominated by low Mulga woodlands (*Acacia aneura* complex) on plains reduced to scrub on hills, with tree steppe of *Eucalyptus* sp., *Triodia* sp. on sandplains, saltbush shrubland on calcareous soils and saline areas with samphire (Beard 1990, Thackway and Cresswell 1995). The bioregion is rich and diverse in both its flora and fauna although most species are wide-ranging and usually occur in adjoining regions (McKenzie *et al.* 2003).

The Study Area is located entirely within the Western Murchison subregion, which is characterised by outcrop and fine textured Quaternary alluvial and eluvial surfaces (extensive hardpan washplains that dominate and characterise the subregion) mantling granitic and greenstone strata of the northern part of the Yilgarn Craton (Desmond *et al.* 2001). Vegetation is dominated by Mulga Shrublands often rich in ephemerals, hummock grasslands, and saltbush shrublands (Desmond *et al.* 2001).

3.4 Land Systems

An assessment of land systems provides an indication of the occurrence and distribution of fauna habitats and vegetation within and surrounding the Study Area (Curry *et al.* 1994). Land systems across the Murchison have been mapped by the Natural Resources Assessment Group of the former Department of Agriculture (now Department of Agriculture and Food Western Australia, DAFWA) and provide a comprehensive description of biophysical resources within the area (Curry *et al.* 1994). There are five land systems present within the Study Area (**Table 3-1**). All of these are represented in the mine survey area, of which half is characterised by the Yandil landsystem. The remainder of the mine area is comprised primarily of the Yanganoo, Sherwood and Belele land systems, with the Violet land system contributing less than 1 ha. Only two land systems are represented in the haul road corridor, the majority of which is comprised of the Sherwood land system, with a smaller portion of the Violet land system in the northwest. (**Table 3-1; Figure 3-2**).

Table 3-1: Land systems mapped over the Study Area

Land system	Description	Mine survey area		Haul Road survey area	
		ha	%	ha	%
Belele	Hardpan wash plains interspersed by low sandy (wanderrie) banks supporting tall shrublands of mulga with understorey shrubs on the hardpan plains and non-saline shrubs with perennial grasses on the banks	204	11	0	0
Sherwood	Extensive, gently sloping stony and sandy plains on granite and gneiss below saline footslopes of lateritised breakaways and outcrops of weathered rock; mainly supports scattered mulga shrublands with understorey non-halophytic and halophytic shrubs	280	16	497	87
Violet	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supports mulga and bowgada-dominated shrublands, with dense mulga groves and patchy halophytic shrublands	1	<1	73	13
Yandil	Flat hardpan wash plains, extensively uniform and carrying light to moderate mantles of small pebbles and gravels; occasional wanderrie banks and groves; supports mulga shrublands, but widely degraded	905	50	0	0
Yanganoo	Almost flat hardpan wash plains, with or without small wanderrie banks and showing variable development of weak grooving; supports mulga shrublands	409	23	0	0
	Total	1,799	100	570	100

NB: All numbers have been rounded to the nearest whole number

Source: Curry *et al.* (1994)

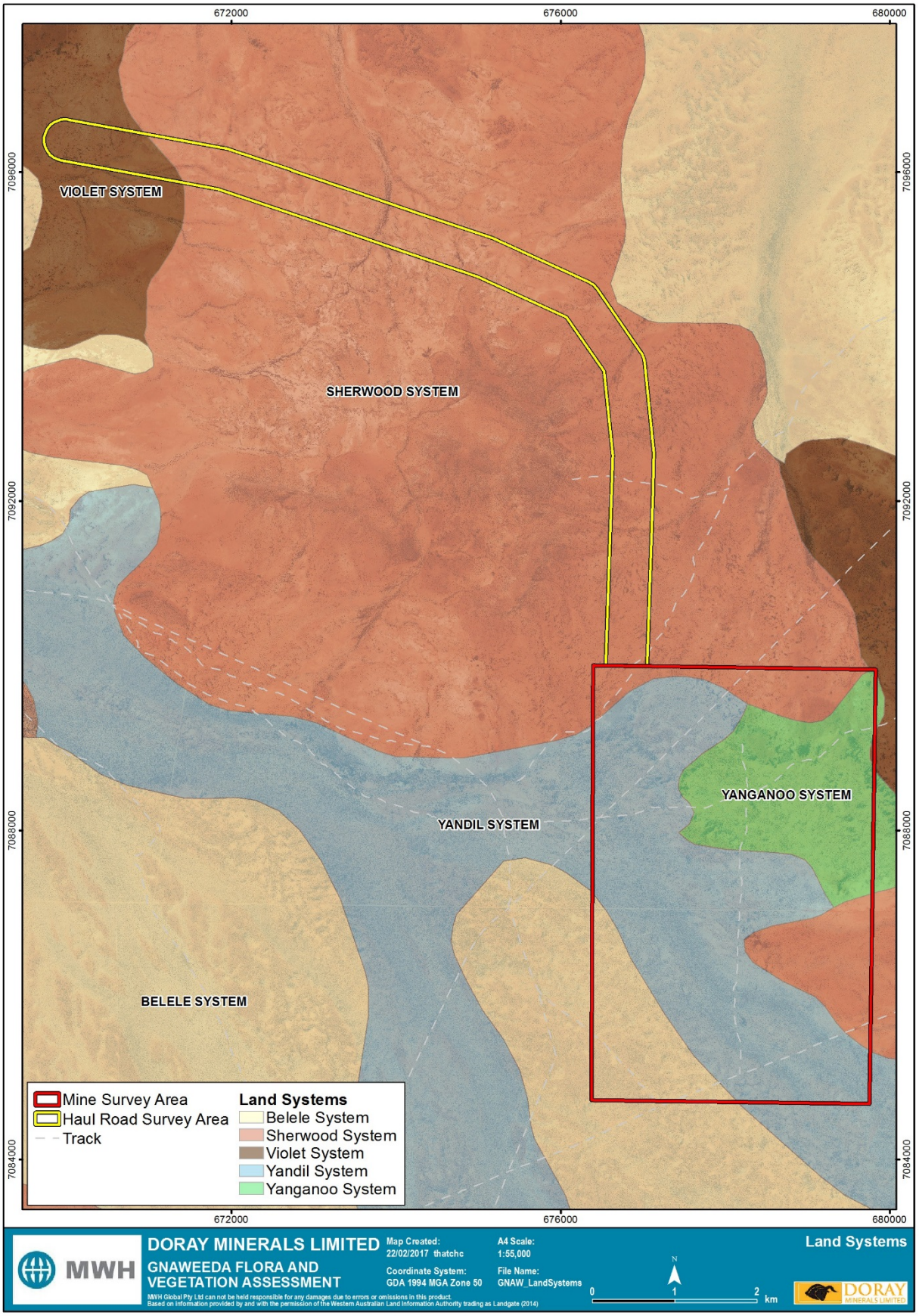


Figure 3-2: Land systems of the Study Area and surrounds

3.5 Surface Geology

Geoscience Australia (2015) have compiled a 1:1 million scale Geology of Western Australia dataset from the latest published 1:250,000 scale geological maps, augmented by more recent 1:100,000 scale and regional compilation maps.

The Western Murchison subregion is characterised by extensive hardpan washplains, over granite and greenstone of the Northern part of the Yilgarn Craton. The Study Area is associated with regolith, meta-igneous felsic and igneous felsic intrusive lithology dominated by alluvial and colluvial sediments, felsic schist, lateritic duricrust and granites and quartz. Six geological units occur with the Study Area (**Table 3-2** and **Figure 3-3**) (Geoscience Australia 2015).

Table 3-2: Surface geology present within the Study Area

Code	Description	Mine survey area		Haul Road survey area	
		ha	%	ha	%
Qa	Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted	199	11	0	0
Qrc	Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite	773	43	326	57
Ary	Strongly foliated felsic rock, quartz-muscovite schist, quartz-feldspar schist probably derived from felsic volcanic or volcaniclastic rocks	0	0	36	6
Ag	Undifferentiated felsic intrusive rocks, including monzogranite, granodiorite, granite, tonalite, quartz monzonite, syenogranite, diorite, monzodiorite, pegmatite. Locally metamorphosed, foliated, gneissic. Local abundant mafic and ultramafic inclusions	0	0	208	37
Czs	Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, aeolian sand	741	41	0	0
Czl	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite	86	5	0	0
	Total	1799	100	570	100

NB: All numbers have been rounded to the nearest whole number

Source: Geoscience Australia (2015)

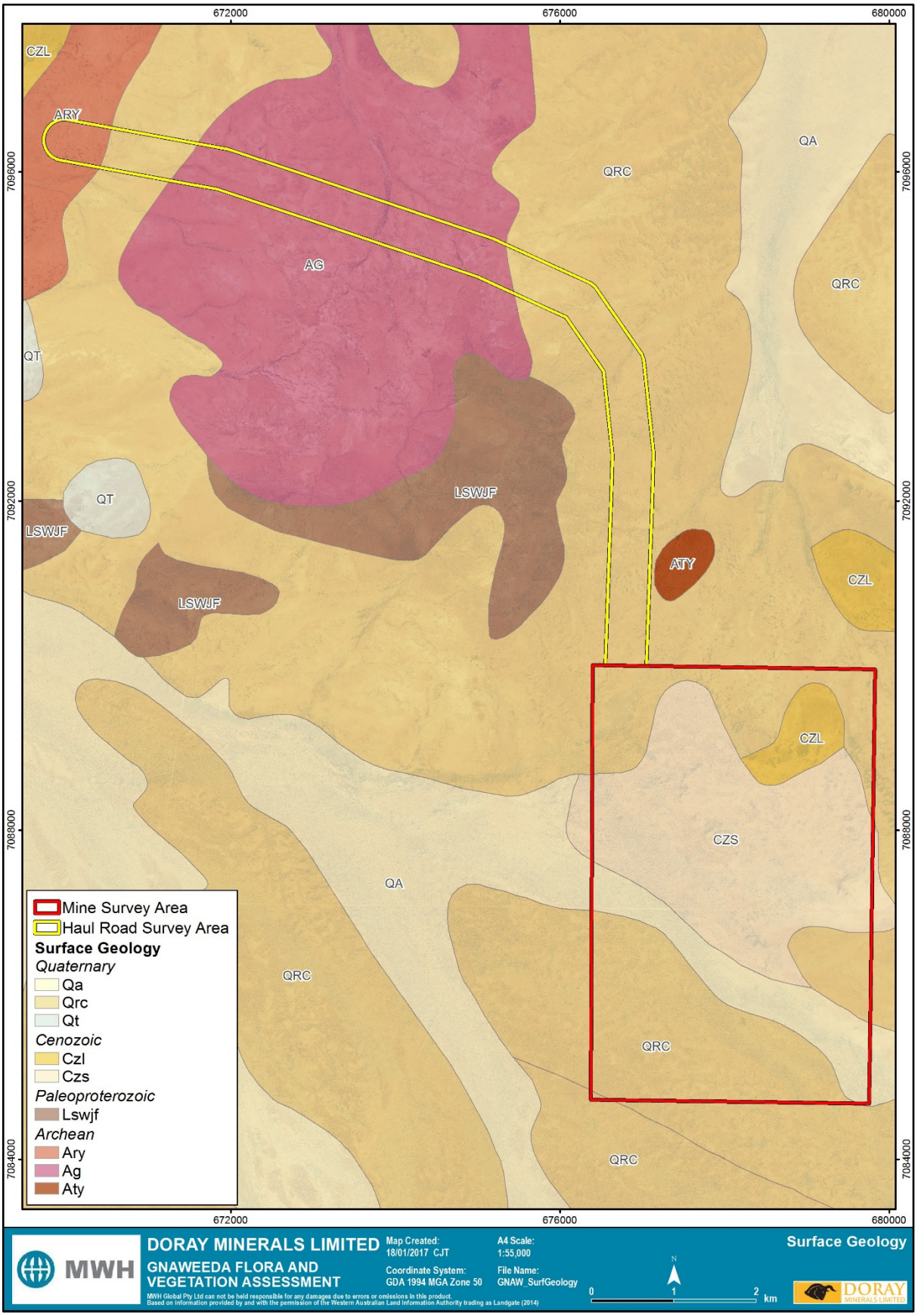


Figure 3-3: Surface Geology units present within the Study Area and surrounds

3.6 Soils

The Atlas of Australian Soils (Northcote *et al.* 1960-1968) was compiled by CSIRO to provide a consistent national description of Australia's soils. A digital version of the Atlas of Australian Soils was created by The National Resource Information Centre (NRIC) in 1991.

The Study Area comprises two soils units; My50 (1,580.0 ha, 67%) and BE2 (788.3 ha, 33%) (**Figure 3-4**). The My50 soil unit occurs entirely within the mine survey area (1,580.0 ha, 88%), while the BE2 soil unit occurs entirely within the haul road survey area (570 ha, 100%) and a small portion in the north eastern section of the mine survey area (219 ha, 12%).

The My50 soil unit generally consists of undulating terrain on granites with rocky granitic hills, bosses, and tors, with some breakaways, and a surface stone mantle. The chief soils seem to be shallow earthy loams underlain by a red-brown hardpan. The shallow soils are underlain by a red-brown hardpan which is often exposed in eroded sites (Northcote *et al.* 1960-1968).

The BE2 soil unit is a broad plain with a scattering of surface gravels. The chief soils are shallow neutral red earths and shallow earthy loams, in intimate micro-association. The soils are underlain by a red-brown hardpan (Northcote *et al.* 1960-1968).

3.7 Hydrology

The Study Area lies within the Murchison River Drainage Basin, which drains westward towards the Indian Ocean (Curry *et al.* 1994). The Study Area occurs in the Murchison River Catchment and is surrounded by minor ephemeral flow-lines. Drainage is ephemeral, with very intermittent flow, that may become prolonged after heavy rainfall (Curry *et al.* 1994).

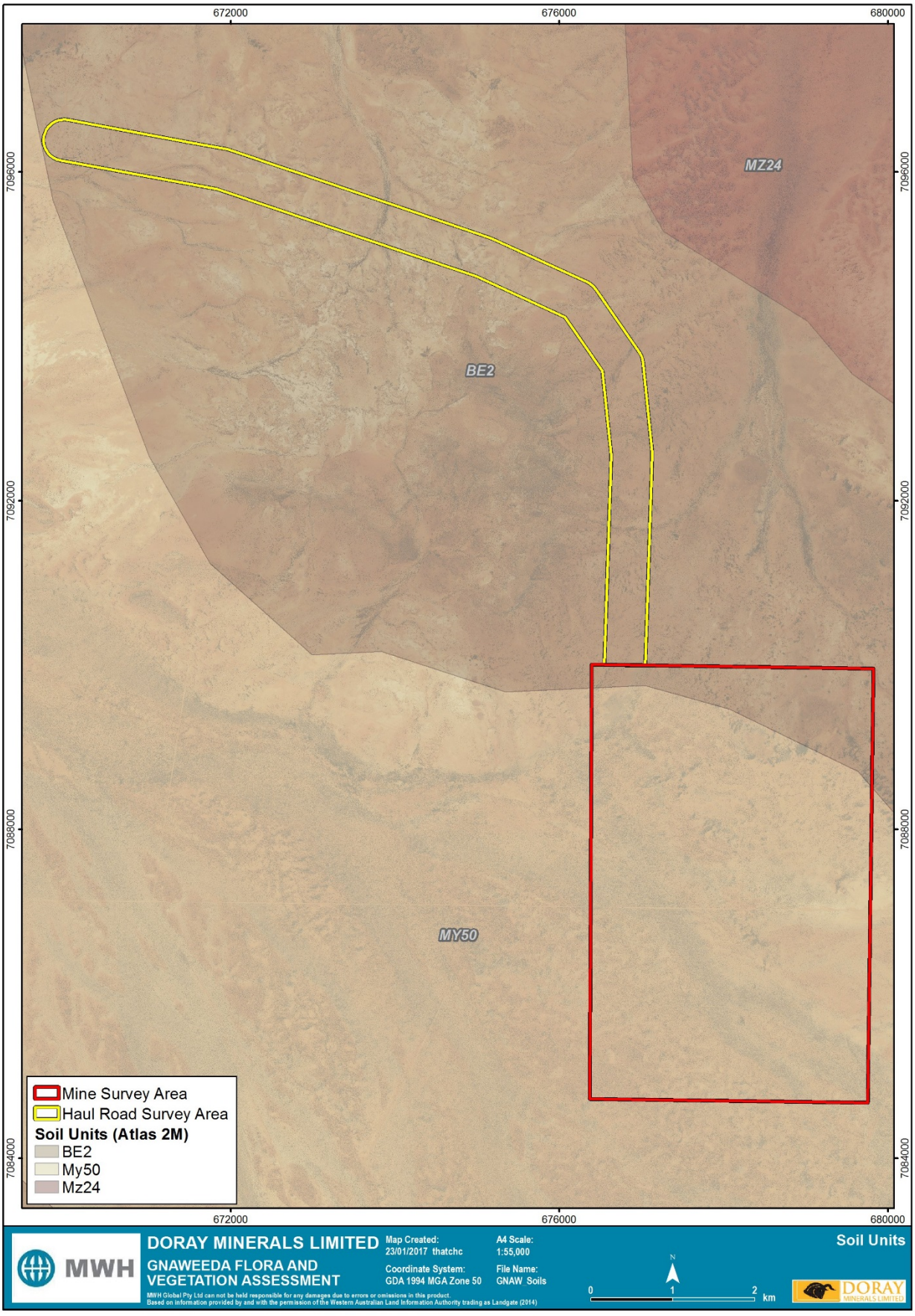


Figure 3-4: Broad soil mapping of the Study Area and surrounds

3.8 Pre-European Vegetation

Vegetation mapping of Western Australia was completed on a broad scale (1:1,000,000 and 1:250,000) by Beard (1975), who classified vegetation into broad vegetation associations. These vegetation associations were re-assessed by Shepherd *et al.* (2002) to account for clearing in the intensive land use zone, and to divide some larger vegetation units into smaller units. Shepherd *et al.* (2002) developed a series of systems to assist in the removal of mosaics; however, some mosaics still occur. Vegetation system associations described by Shepherd *et al.* (2002) correspond with that of Beard (1975).

The Study Area occurs within the Austin Botanical District of the Eremaean Province (Beard 1990). The Austin Botanical District corresponds broadly to the Murchison region which was mapped by Beard (1976) at a 1:1,000,000 scale. Four vegetation system associations mapped by Beard (1976), and reinterpreted by Shepherd *et al.* (2002), intersect the Study Area (**Table 3-3** and **Figure 3-5**); Upper Murchison 18.2, 29 and 39.1, and Wiluna 18.

The current extent remaining of the vegetation system associations are more than 99% across four regional and local scales (State, bioregion, subregion and Local Government Authority (LGA), **Table 3-4**) (Government of Western Australia 2015). The current extent remaining is well above the advised threshold for biodiversity conservation of 30% remaining (EPA 2000).

Table 3-3: Pre-European vegetation system associations of the Study Area

Vegetation System Association	Description	Mine Survey Area		Haul Road Survey Area	
		ha	%	ha	%
Upper Murchison 18.2	Low woodland; mulga (*Acacia aneura*)	0	0	334	59
Upper Murchison 29	Sparse low woodland; mulga, discontinuous in scattered groups	1,725	96	51	9
Upper Murchison 39.1	Shrublands; mulga scrub	0	0	185	32
Wiluna 18	Low woodland; mulga (*Acacia aneura*)	74	4	0	0
	Total	1,799	100	570	100

NB: All numbers have been rounded to the nearest whole number

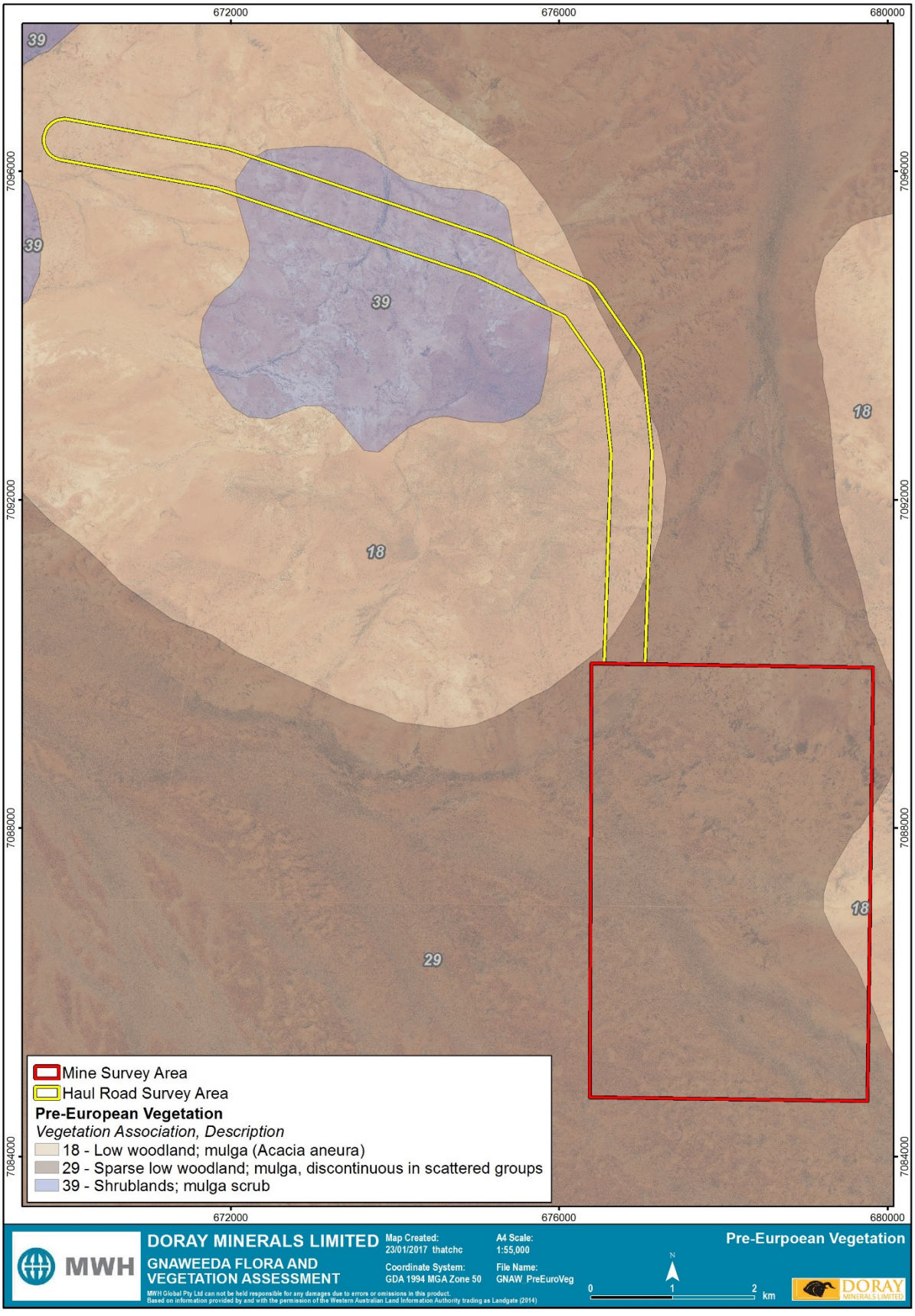


Figure 3-5: Pre-European vegetation associations occurring within the Study Area and surrounds

Table 3-4: Pre-European extent of vegetation system associations remaining

Code	Scale	Pre-European extent (ha)	Current extent (ha)	Current extent remaining (%)	Current extent protected (%)
Upper Murchison 18.2	State	1,901,789	1,897,254	99.76	0.00
	Bioregion	1,900,879	1,896,344	99.76	0.00
	Subregion	1,640,344	1,635,842	99.73	0.00
	LGA	710,099	705,877	99.41	0.00
Upper Murchison 29	State	1,823,263	1,822,786	99.97	0.00
	Bioregion	1,823,090	1,822,613	99.97	0.00
	Subregion	1,817,292	1,816,815	99.97	0.00
	LGA	806,632	806,172	99.94	0.00
Upper Murchison 39.1	State	411,827	410,748	99.74	0.00
	Bioregion	411,827	410,748	99.74	0.00
	Subregion	399,337	398,396	99.76	0.00
	LGA	138,862	137,940	99.34	0.00
Wiluna 18	State	4,308,329	4,290,587	99.59	1.05
	Bioregion	4,307,939	4,290,197	99.59	1.05
	Subregion	34,436	34,166	99.22	0.00
	LGA	793,158	793,066	99.99	0.00

NB: Hectares have been rounded to the nearest whole number.

Source: Government of Western Australia (2015)

4 Desktop Assessment

4.1 Literature Review

Background information on the Study Area and surrounds was compiled prior to the field survey. Historical vegetation mapping conducted by (Beard 1975) and Shepherd *et al.* (2002), land systems mapping (Curry *et al.* 1994), and the IBRA classification system (Desmond *et al.* 2001) were consulted to provide broad contextual knowledge of the vegetation unites likely to be encountered within the Study Area.

The literature review also considered the report Flora and Vegetation of the Andy Well Survey Area (Mattiske Consulting 2011) provided by Doray. The Andy Well survey area comprised an area of 900 ha, inclusive of a portion of the current Study Area and was conducted in April 2011, after a high rainfall season, with no limitations identified (Mattiske Consulting 2011). Sixty-nine (69) flora sites were completed, with 172 vascular flora taxa recorded within the Andy Well survey area. No threatened or priority flora taxa were confirmed, however one potential priority 1 species *Euphorbia ? sarcostemmoides* was identified (Mattiske Consulting 2011). There are no records of *Euphorbia sarcostemmoides* known from the Murchison bioregion (WAH 2016). Three introduced flora taxa were identified, however one of these is no longer considered a weed, the remaining two (**Bidens bipinnata* and **Oxalis corniculata*) are considered in **Section 4.5**.

4.2 Database Searches

Database searches were undertaken to generate a list of vascular flora taxa previously recorded within, and nearby, the Study Area, including introduced species and taxa of conservation significance. Conservation codes for flora of conservation significance are provided in **Appendix B**. Four database searches were conducted around a central coordinate (50J 677974 mE, 7086460 mN), with varying buffers as deemed appropriate (**Table 4-1**).

Table 4-1: Database searches

Database	Reference	Buffer (km)
Threatened and Priority Ecological Communities	DPaW (2016c)	40
Threatened and Priority Flora	DPaW (2016d)	40
NatureMap	DPaW (2016b)	40
Protected Matters	DoEE (2016)	20

4.3 Flora of Conservation Significance

A total of 65 conservation significant flora taxa (those listed under the EPBC Act, WC Act, or Parks and Wildlife's Priority Flora List) were identified from the database search and literature review (**Appendix C**, **Appendix D**). Two of these, *Eremophila rostrata* subsp. *rostrata* and *Pityrodia augustensis* are listed as

Threatened under the WC Act. The remaining 63 are Priority listed flora taxa, comprising: 20 Priority 1, two Priority 2, 36 Priority 3, and five Priority 4 flora taxa.

Flora taxa of conservation significance identified by the desktop assessment were assessed and ranked on the likelihood of occurring within the Study Area. The rankings were assigned using the following definitions:

Confirmed – the presence of the species in the Study Area has been recorded unambiguously during the last ten years

Very likely – the Study Area lies within the known distribution of the species and is likely to contain suitable habitat(s), plus the species generally occurs in suitable habitat and has been recorded nearby within the last 20 years;

Likely – the Study Area lies within the known distribution of the species and the species has been recorded within 20 km in the last 20 years; however, either:

a) the Study Area is likely to contain only a small area of suitable habitat, or habitat that is only marginally suitable; or
b) the species is generally rare and patchily distributed in suitable habitat;

Possible – there is an outside chance of occurrence, because:

a) the Study Area is just outside the known distribution of the species, but is likely to contain suitable and sufficient habitat (the species may be common, rare, or patchily distributed); or
b) the Study Area lies within the known distribution of the species, but the species is very rare and/or patchily distributed; or
c) the Study Area lies on the edge of, or within, the known distribution and is likely to contain suitable habitat, but the species has not been recorded in the area for over 20 years.

Unlikely – the Study Area lies outside the known distribution of the species, the Study Area is unlikely to contain suitable habitat, and the species has not been recorded in the area for over 20 years.

Prior to the survey, no Priority flora taxa were confirmed as occurring within the Study Area, two were considered likely to occur and 13 were considered to possibly occur within the Study Area (**Table 4-2** and **Figure 4-1**). The remaining 50 conservation significant flora taxa identified by the Desktop Assessment were considered unlikely to be found within the Study Area (a full summary of the Desktop Assessment, and the likelihood of each taxa to occur within the Study Area is provided in **Appendix E**).

Table 4-2: Conservation significant flora that might occur in the Study Area

Taxon	Plant description and habitat (WAH 2016)
Likely	
Calytrix verruculosa (P3)	Low myrtaceous shrub, 0.4 to 0.75 m high with pink to white flowers August or October. Known to occur in sandy clay.
Drummondita miniata (P3)	Mid to tall divaricately branched myrtaceous shrub, 0.5 to 2 m high, with orange red flowers July to August or November. Known to occur on laterite and breakaways.
Possible	
Rhodanthe sphaerocephala (P1)	Erect annual herb, to 0.25 m high, with ascending branches, flowering in October. Known to occur on clayey loam, on flats
Sida picklesiana (P1)	Low shrub. Known to occur on ironstone.
Wurmbea sp. Denham Pool (F. Hort et al. 2216) (P1)	Description unknown.
Homalocalyx echinulatus (P3)	Mid to low shrub, 0.45 to 1 m high, with pink flowers pink, June to September. Known to occur on laterite, breakaways and sandstone hills.
Maireana prosthecochaeta (P3)	Low open, densely-leaved shrub, 0.3 to 0.6 m high. Known to occur on laterite, hills, and salty places.
Menkea draboides (P3)	Prostrate, spreading annual, herb, to 0.6 m wide with white/cream flowers August to September. Known to occur on red sand or clay, and granite.
Ptilotus lazaridis (P3)	Herb or shrub, to 0.6 m high with pink/red flowers July or October. Known to occur on clay loam and floodplains.
Ptilotus luteolus (P3)	Description unknown.
Verticordia jamiesonii (P3)	Shrub, 0.2 to 0.6 m high with white/pink flowers, September to October. Known to occur on sandy clay soils and lateritic breakaways.
Acacia speckii (P4)	Bushy, rounded shrub or tree, 1.5 to 3 m high. Known to occur on rocky soils over granite, basalt or dolerite, and rocky hills or rises.
Dodonaea amplisemina (P4)	Dioecious, multi-stemmed shrub, 0.3 to 1 m high. Known to occur on red-brown sandy clay, on basalt and gabbro and banded ironstone, or on dolerite and quartzite, and rocky hills.
Goodenia berringbinensis (P4)	Ascending annual herb, 0.1 to 0.3 m high with yellow flowers in October. Known to occur on red sandy loam, and along watercourses.
Grevillea inconspicua (P4)	Intricately branched, spreading shrub, 0.6 to 2 m high with white/pink-white flowers June to August. Known to occur on loam and gravel, along drainage lines, on rocky outcrops, and creeklines.

4.4 Vegetation of Conservation Significance

Only one Threatened Ecological Community (TEC), the Depot Springs stygofauna community, is recognised in the Murchison region of Western Australia. This TEC was not identified within the 40 km database search buffer around the Study Area.

The Parks and Wildlife Threatened and Priority Ecological Community Database search (DPaW 2015c) did not identify any Priority Ecological Communities (PECs) known to occur within the Study Area, however three communities, Killara Calcrete, Killara North Calcrete and Karulundi Calcrete were recorded within the search buffer (**Figure 4-1**). These PECs, which occur within 40 km of the Study Area, relate to unique assemblages of invertebrates in the groundwater and do not relate to terrestrial vegetation. As the PECs do not relate to terrestrial vegetation, they will not be discussed further within this report.

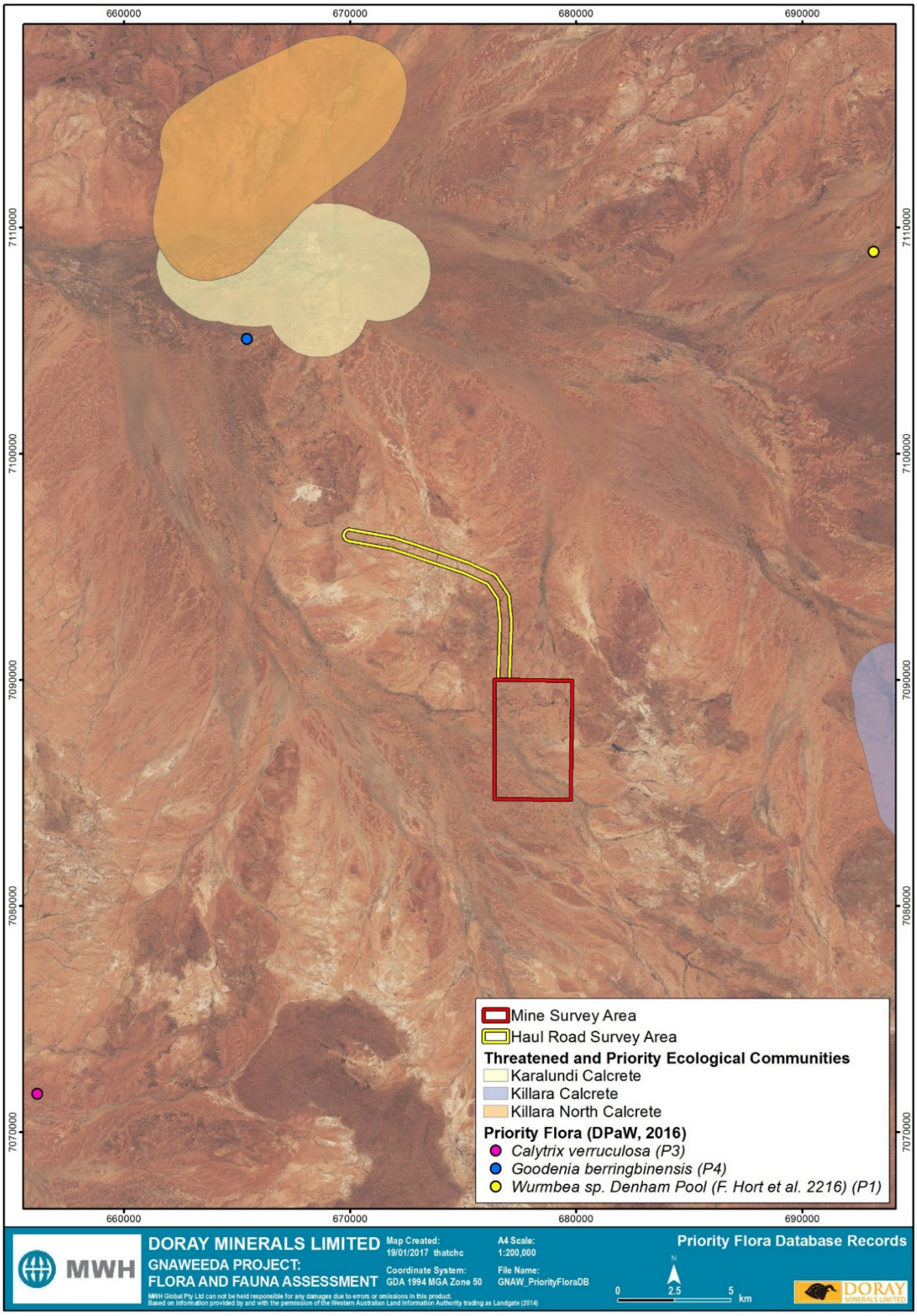


Figure 4-1: Priority flora and ecological communities known to occur in close proximity to the Study Area

4.5 Introduced Taxa

The NatureMap (DPaW 2016b) and Protected Matters (DoEE 2016) database searches, together with the literature review identified a list of seventeen introduced flora that may potentially occur within the Study Area (**Appendix F**). This list was reviewed to identify Weeds of National Significance (WoNS) and Declared Plant Pests (DPP).

4.5.1 Weeds of National Significance

The Commonwealth of Australia, in collaboration with the states and territories, has identified 32 WoNS based on an assessment process that prioritised these weeds on their invasiveness, potential for spread and environmental, social and economic impacts (DoEE 2017). A list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012 (DoEE 2017).

Landowners and land managers at all levels are responsible for managing WoNS. State and territory governments are responsible for legislation, regulation and administration of weeds. The WoNS were selected as they require coordination among all levels of government, organisations and individuals with weed management responsibilities.

None of the introduced taxa identified during the literature review and database searches are listed as a WoNS (DoEE 2017).

4.5.2 Declared Plant Pests

To protect Western Australian agriculture the DAFWA regulates harmful plants under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). Plants that are prevented entry into the state or have control or keeping requirements within the state are known as declared pests. The main purposes of the BAM Act and its regulations related to Declared Plant Pests (DPPs) are to: prevent new plant pests (weeds) from entering Western Australia; manage the impact and spread of those pests already present in the state; and safely manage the use of agricultural chemicals.

The BAM Act has categorised the weeds of Western Australia into four main classifications:

- Declared Pests (under Section 22 of the Act);
- Permitted (under Section 11 of the Act);
- Prohibited (under Section 12 of the Act); and
- Permitted requiring a permit (Section 73, BAM Regulations 2013).

Under the BAM Act all declared plant pests are placed in one of three categories:

- C1 (Exclusion) — Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State;
- C2 (Eradication) — Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still feasible; and
- C3 (Management) — Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

None of the introduced taxa identified during the literature review and database searches are listed as a DPPs (DAFWA 2016).

4.5.3 Environmental Weeds

In an effort to address weed management from an on-ground operational perspective and implement an integrated approach to weed management on Parks and Wildlife-managed lands in Western Australia, the Weed Prioritisation Process for Parks and Wildlife was developed in 2008, and updated in 2013 (DPaW 2013). These ranking are also useful in maintaining best practice for prioritising weed management on privately managed land. Parks and Wildlife prioritised weeds in each region, based on their:

- Invasiveness;
- Ecological impact;
- Potential and current distribution; and
- Feasibility of control.

The resulting priorities focus on weeds considered to be high impact, rapidly invasive and still at a population size that can feasibly be eradicated or contained to a manageable size. This means that weed species that are already widespread are not ranked as a high priority.

None of the introduced taxa identified during the desktop assessment as potentially occurring within the Study Area are listed as a Priority Alert weed taxa in the Midwest Region. Two of the introduced taxa identified from the desktop assessment, **Cenchrus ciliaris* (Buffel grass) and **Leucaena leucocephala* (Leucaena) have been rated as having high ecological impact with potential for rapid spread in the Midwest region (DPaW 2016a).

5 Methodology

5.1 Survey Timing and Weather

The field survey was undertaken over seven days, from 12 to 18 October 2016, with supplementary survey effort undertaken during the fauna survey, over four days from 21 to 24 November (**Table 5-1**). In the six months preceding this survey 111.8 mm of rainfall was recorded, similar to the long term average of 108.6 mm (**Figure 5-1**).

Table 5-1: Survey timing and climatic conditions

Date	Survey Team	Temperature		Rainfall (mm)	Relative Humidity (%)
		Minimum (°C)	Maximum (°C)		
12/10/2016	M. Stone & S. Fox	15.5	33.5	0	9
13/10/2016	M. Stone & S. Fox	17.4	37.6	0	8
14/10/2016	M. Stone & S. Fox	19.9	37.8	0	10
15/10/2016	M. Stone & S. Fox	14.7	25.1	0	18
16/10/2016	M. Stone & S. Fox	10.3	25.1	0	10
17/10/2016	M. Stone & S. Fox	9.9	30.1	0	6
18/10/2016	M. Stone & S. Fox	15.0	32.5	0	6
21/11/2016	S. Fox & P. Bolton	19.0	32.3	0	11
22/11/2016	S. Fox & P. Bolton	19.8	33.1	0	9
23/11/2016	S. Fox & P. Bolton	20.6	34.3	0	11
24/11/2016	S. Fox & P. Bolton	20.8	33.6	0	11

Source: Meekatharra Airport weather Station No. 007045 (BoM 2017)

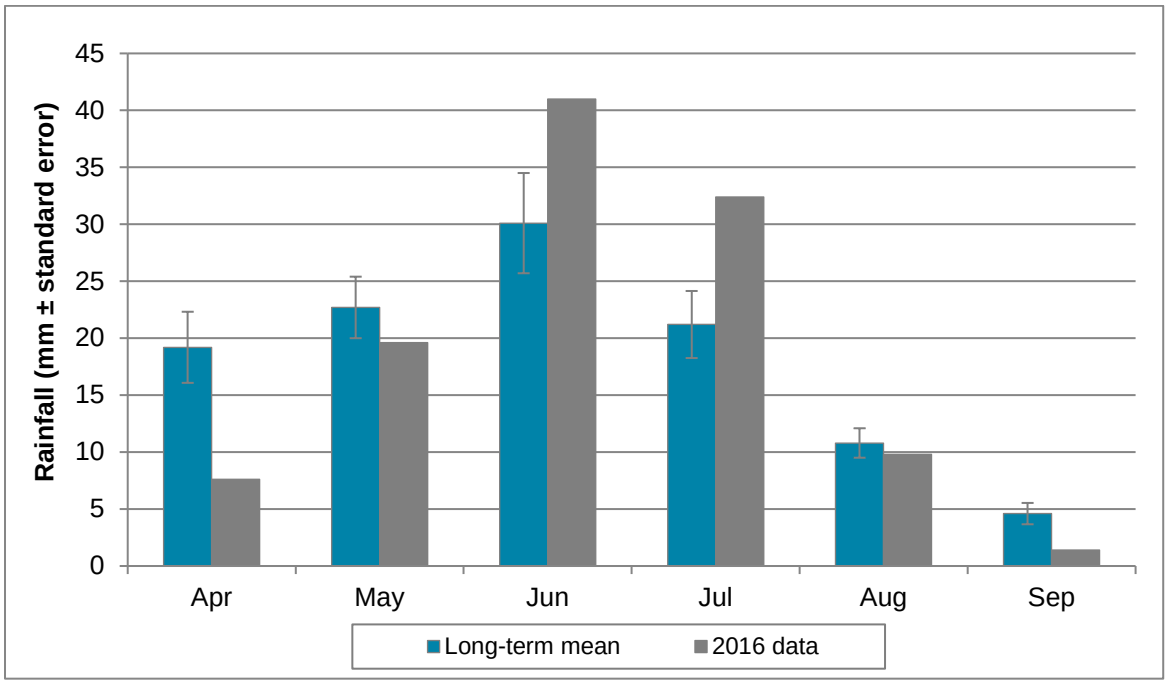


Figure 5-1: Monthly rainfall prior to the survey

EPA Guidance Statement 51 (2004) recommends that surveys be undertaken following the season of highest rainfall to optimise the likelihood of encountering flowering and fruiting taxa and capturing ephemeral species. The timing of the survey was considered appropriate for a Level 2 Flora Survey as it was undertaken following the highest rainfall period for the year. Despite this, many of the annual and ephemeral flora taxa observed during the survey could not be identified as they had already finished their reproductive cycle and senesced. It is anticipated that had the survey been conducted earlier in the year a greater number of annual and ephemeral flora taxa would have been recorded.

5.2 Survey Team and Licensing

The field survey was led by Megan Stone, with assistance from Sophie Fox, both experienced botanists in the Murchison region, and well-practiced in conducting level 2 flora and vegetation surveys. The supplementary survey was undertaken by Sophie Fox, with assistance from Paul Bolton. All plant collections were taken under flora collecting permits SL011840 (Megan Stone) and SL011963 (Sophie Fox) pursuant to the WC Act Section 23C and Section 23F.

5.3 Level 2 Flora and Vegetation Survey Design

Aerial photography (Scale 1:10,000) of the Study Area and imagery from Google Earth Pro©, were used with previous vegetation mapping (Beard 1975), land systems mapping (Curry *et al.* 1994) and soil landscape mapping (Northcote *et al.* 1960-1968) to determine broad preliminary vegetation unit boundaries prior to the field survey. Where practical at least three quadrats, or high level relevés were established in each of the preliminary vegetation types, to ensure that each vegetation unit occurring within the Study Area was captured by the survey and described.

A total of 77 flora sites, comprising 63 quadrats and 14 relevés were established (**Figure 5-2**, **Appendix G**). The corners of each 20 x 20 m quadrat were oriented North West, North East, South East, South West, with the north-west corner marked with a fence dropper and yellow cap (any deviation from orientation and corner marked is noted in **Appendix G**).

All vascular flora taxa within each quadrat (including overhang from plants rooted outside the boundary) were recorded, with their corresponding height and percentage foliar cover (PFC). A brief summary of the vegetation assemblage at each site was also recorded to aid in producing vegetation unit descriptions (ESCAVI 2003) (**Appendix H**).

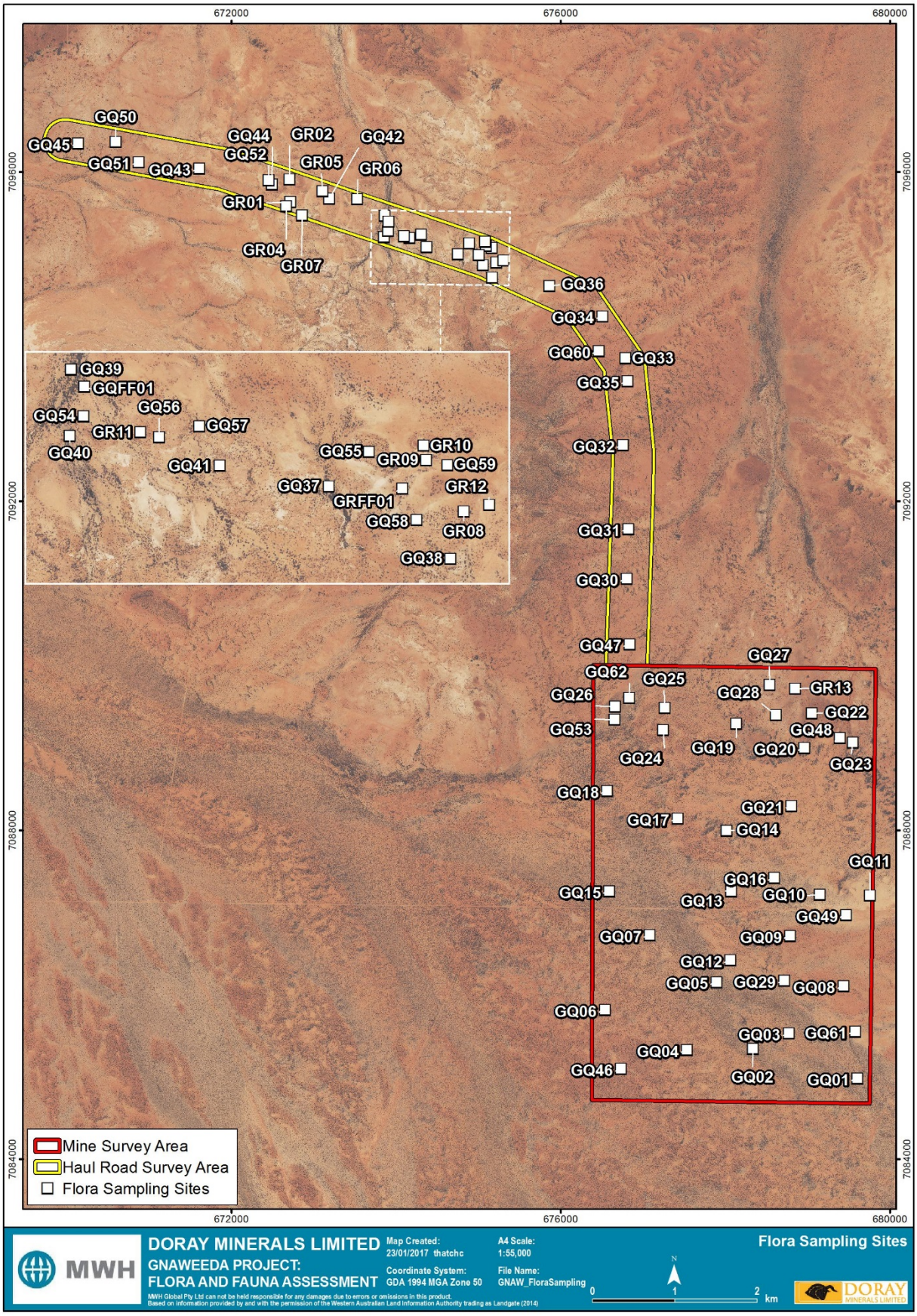


Figure 5-2: Flora site locations

In addition, the following information was recorded at each quadrat:

- Quadrat / relevé number;
- Survey date;
- Personnel;
- GPS coordinates of each corner (GDA 94);
- Site photograph – taken from the north-west corner, facing south-east;
- Soil characteristics (texture and colour);
- Geology (type, size and nature of any rocks, stones, gravel, or outcropping);
- Topography (landform type and aspect);
- Vegetation condition (based on Trudgen M.E. 1988; **Appendix I**);
- Disturbance (if present); and
- Approximate time since last fire.

Any flora taxa observed opportunistically around quadrat plots or while traversing on foot within the Study Area were also recorded. For any populations of taxa known to be conservation significant or introduced flora observed, a GPS location and a count of the individuals present, or percentage foliar cover for a given area, were recorded.

Prior to the survey, a list of conservation significant flora with the likelihood or potential to occur within the Study Area was compiled (**Appendix E**). Field personnel familiarised themselves with photographs, reference samples and descriptions of these taxa before conducting the survey and once on the ground actively searched for them in and around quadrats, while traversing on foot within the Study Area and in known locations or preferred habitat encountered in the field.

5.4 Targeted Searching

During the field survey, targeted searching was undertaken for priority flora taxa identified by the desktop assessment as known to occur, or likely to occur within the Study Area. At the time of the survey the precise haul road alignment was unknown. This together with the large size of the Study Area, meant that it was not practical to complete systematic grid searches across the entire Study Area within the time available. Instead, in the initial survey targeted searches focused on habitat likely to support priority flora taxa known to occur within the Study Area. The follow up survey (conducted by Botanist Sophie Fox while on site assisting the associated Fauna survey for the Study Area) focused on conducting searches in locations where Priority flora specimens had been collected during the initial survey, and in any analogous habitat to better understand the abundance and distribution of these species within the Study Area.

In addition to targeted searching for specific priority flora taxa in particular habitats, personnel actively searched for Priority listed flora taxa and opportunistic flora taxa while completing quadrats and traversing on foot. Personnel also identified suitable habitat for targeted searches while driving in the Study Area.

5.5 Identification of Flora Specimens

Plant taxa that could not be easily identified in the field were collected and pressed for subsequent identification at the Western Australian Herbarium (WAH). Identifications were carried out by experienced taxonomist Sharnya Thompson. All identified taxa were checked against FloraBase to ensure currency and validity. Any conservation significant flora taxa, including potential threatened and priority species, range extensions and potential new taxa have been verified and vouchered at the WAH. Threatened and Priority Flora Report Forms (TPRFs) have also been submitted to DPaW.

5.6 Statistical Analysis

5.6.1 Multivariate Analysis

The vegetation composition of each quadrat was compared using cover class values for each species recorded and analysed using multivariate analysis tools in Primer v6. Cover values were tested for similarity using the Bray-Curtis coefficient. Vegetation units were defined based on approximately 40-80% similarity and distinguished visually in a dendrogram based on a Similarity Profile Test (SIMPROF) Cluster analysis. The analysis was undertaken on a data matrix comprising 87 vascular taxa and 77 flora sites. Relevés were included in the analysis as they were undertaken with a high level of accuracy for this survey, the only difference from the quadrats being that they were not permanently marked.

The presence of ephemeral taxa is strongly influenced by seasonal rainfall, and can be highly variable in the Murchison. Ephemeral taxa were included in the initial analysis, which was re-run with ephemerals removed, leaving 87 perennial vascular taxa, to help explain anomalies which had appeared when they were included.

Singletons (flora taxa recorded at only one site), introduced taxa and unidentified or partially identified flora taxa, were excluded from the analysis as due to the properties of the Bray-Curtis coefficient singletons are seen as ‘indicators’ for grouping and therefore bias results. Unidentified flora taxa were removed based on their ambiguity, exceptions were made for taxa that could not be identified but confirmed to be the same across a number of sites.

5.6.2 Species Accumulation Curves

Species accumulation curves were plotted using Primer v6 to determine the adequacy of the survey. The treatments comprised Sobs (Mao Tao), to reflect the number of species observed (based on a given total of species recorded), and richness estimators Chao 1, Chao 2, Jacknife 1, Bootstrap and Michaelis-Menton to predict the total number of flora taxa that could potentially be recorded. Species accumulation curves for this survey were calculated using data collected from the flora sites within the Study Area. All native flora taxa, both annual and perennial, within each flora site were used in generating the species accumulation curve, with the exception of unknown flora taxa that could not be tentatively identified.

5.7 Vegetation Unit Mapping

Broad vegetation mapping was conducted in the field, with vegetation boundaries delineated over aerial photography. Following the completion of the quadrat sampling and taxonomic identifications, these broad vegetation units were refined based on the outputs of the statistical analysis on the floristic data collected from the quadrats and relevés. The vegetation unit mapping was then digitised using geographic information systems (GIS) software.

Vegetation units were described to Level V (Vegetation Association) in the National Vegetation Information System (NVIS) hierarchical structure (ESCAVI 2003) and have been coded based on key dominant taxa (for example AaBb)

5.8 Vegetation Condition Mapping

Vegetation condition was defined within the Study Area using the Trudgen (1988) Vegetation Condition Scale (**Appendix I**) based on the level of disturbance observed in an area. Condition was recorded at each floristic site and additional notes were taken while traversing the Study Area and used to broadly map vegetation condition boundaries. The vegetation condition mapping was then digitised using GIS software.

6 Results

6.1 Flora Composition

A total of 151 vascular flora taxa were recorded within the Study Area (**Appendix K** and **Appendix L**), comprising only native flora taxa representing 28 families and 55 genera. The most represented families were Fabaceae (33 taxa), Chenopodiaceae (20 taxa) and Poaceae (17 taxa). The most represented genera were *Acacia* (22 taxa), *Eremophila* (15 taxa) and *Senna* (10 taxa). This floristic composition is typical of the Western Murchison subregion (Curry *et al.* 1994). No introduced flora taxa (weeds) were recorded.

6.2 Survey Adequacy

A total of 77 flora sites were surveyed across the Study Area, with approximately 0.03 sites completed per hectare. This was considered adequate for ensuring that at least three flora sites were sampled in most vegetation types, and that coverage across the site was sufficient.

The species accumulation curve for the Study Area, based on flora collected from quadrats and relevés, produced a smooth Sobs curve steadily increasing until approaching asymptote (**Figure 6-1**). Estimated species richness for the Study Area ranged from 118 to 167, with an observed value of 126 taxa (**Table 6-1**). Richness estimators indicated that the survey was approximately 76% (Chao 1 and Chao 2) to 107% (Michaelis-Menton) adequate in recording the full complement of vascular flora taxa within the Study Area (**Table 6-1**).

While the observed number of species included in the species accumulation curve data was 126, there were actually 151 recorded from the site, so the data presented is conservative. This is because additional flora species were recorded opportunistically and therefore cannot be included in the analysis as they are not associated with a particular flora site. Furthermore, unknown flora taxa that could not be tentatively identified have been removed from the analysis. Thus, the actual number of flora taxa recorded during the survey, was 90% of the highest expected species richness, and 128% of the lowest expected species richness.

Table 6-1: Species Richness Indicators

Treatment	Expected Species Richness	Percentage adequate
Chao 1	167	76%
Chao 2	167	76%
Jacknife 1	161	78%
Bootstrap	142	89%%
Michaelis-Menton	118	107%

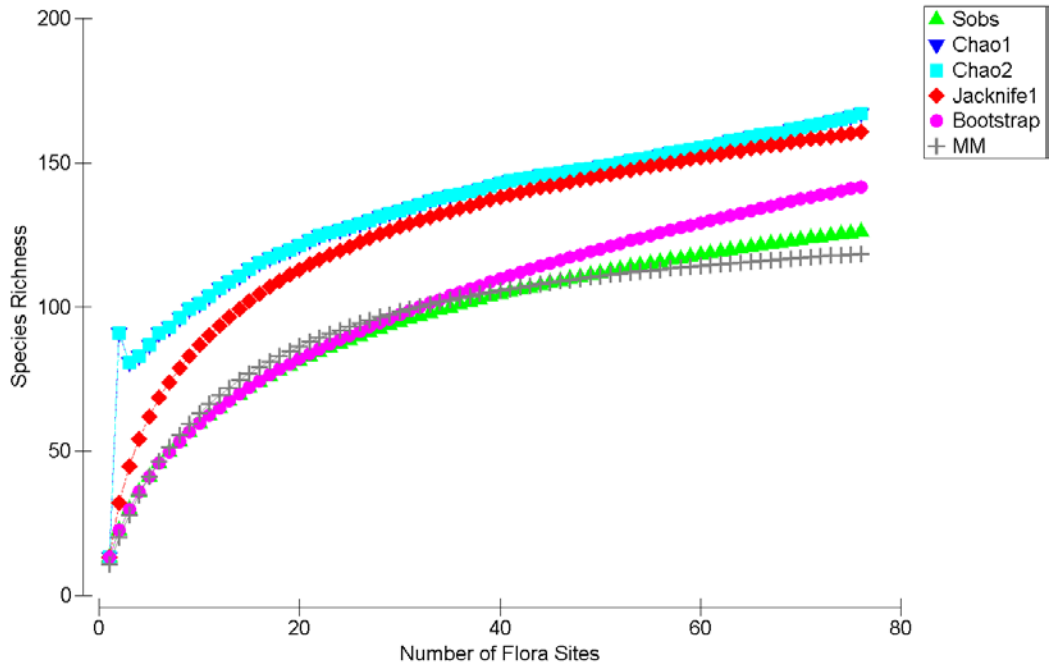


Figure 6-1: Species accumulation curve

6.3 Flora of Conservation Significance

6.3.1 Threatened and Priority Listed Flora

The desktop assessment identified two threatened flora (*Eremophila rostrata* subsp. *rostrata* and *Pityrodia augustensis*) and 63 priority listed flora to potentially occur within the Study Area. Of the 65 conservation significant flora, two were considered likely to occur, while 13 were considered possible to occur within the Study Area (**Table 4-2**). None have previously been recorded from within the Study Area.

The initial October 2016 field survey and the supplementary November 2016 field survey did not record any threatened flora taxa from the Study Area. Two priority flora taxa, *Stenanthemum mediale* (P1) and *Gunniopsis propinqua* (P3) were recorded from the Study Area (**Table 6-2, Figure 6-2** and **Appendix M**). Neither of these taxa were identified by the Desktop Assessment. Both taxa were recorded within the haul road survey area and notably, all records of the higher priority, *Stenanthemum mediale* (P1) occurred in association with the low outcropping breakaways. No priority flora taxa were recorded from the mine survey area.

Table 6-2: Priority flora recorded in the Study Area

Species	Conservation Code	Locations		Individuals	
		Mine	Haul Road	Mine	Haul Road
Stenanthemum mediale	P1	0	7	0	106
Gunniopsis propinqua	P3	0	2	0	2

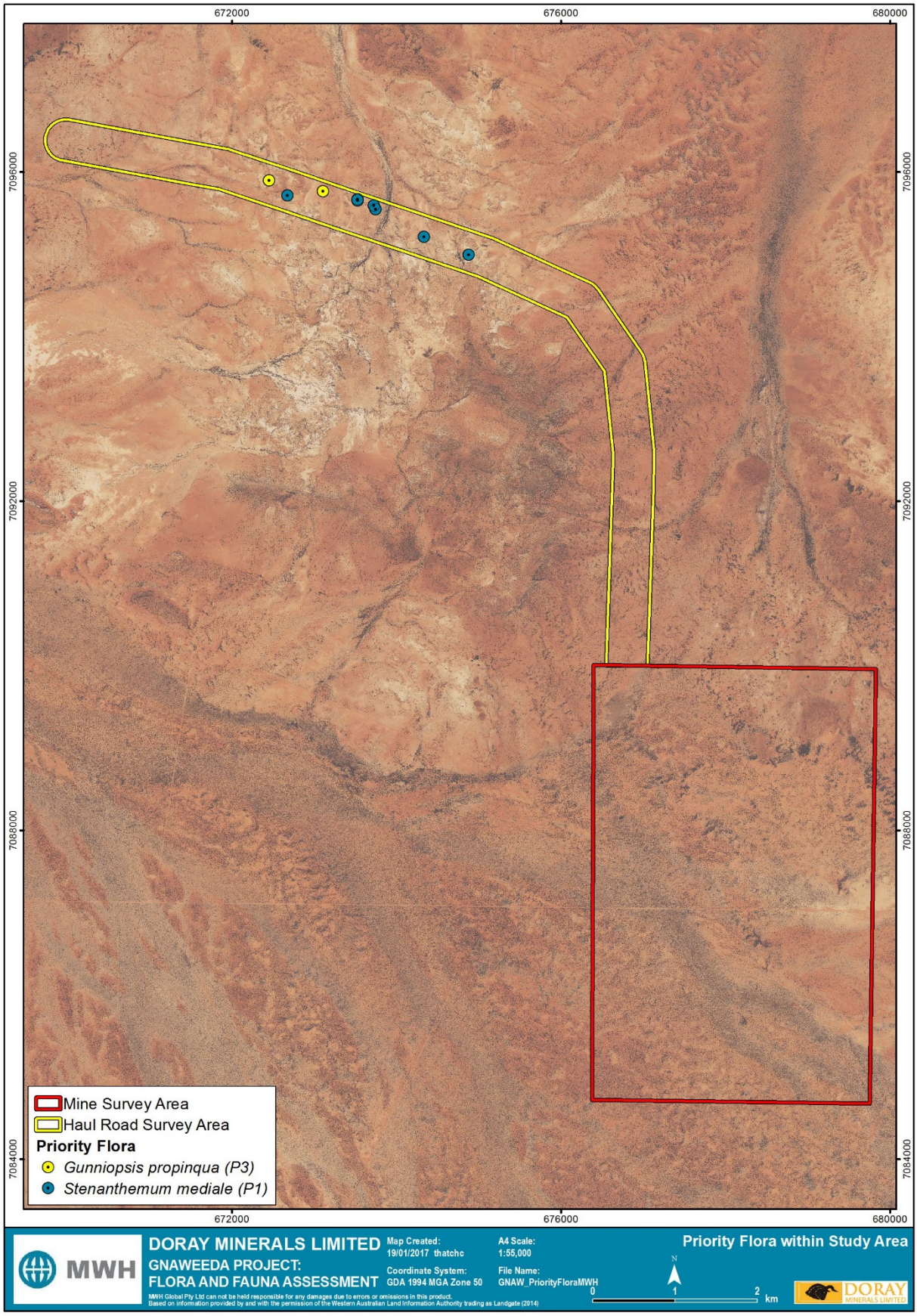


Figure 6-2: Priority flora locations

Stenanthemum mediale is a Priority 1 taxon (**Plate 6-1** and **Plate 6-2**), known to occur primarily in the Murchison region, with one population known from the Great Victoria Desert (WAH 2016). It is an erect shrub to approximately 0.35 m high, flowering April to August (WAH 2016). It is known from habitat comprising red clayey sand (WAH 2016). It was previously known to occur on Yeelirrie Station and Black Hill Station in central Western Australia (Rye 1995), however additional populations have been recorded from Jack Hills, Mount Magnet and Youno Downs. It has been recorded from red clayey sand and flowers and fruits between April and August (Rye 1995).

Plate 6-1: *Stenanthemum mediale* habit

Plate 6-2: *Stenanthemum mediale* flower

Gunniopsis propinqua is a Priority 3 taxon (**Plate 6-3**) known to occur in the Murchison, Gascoyne, Pilbara and Yalgoo regions (WAH 2016). It is a succulent prostrate annual or perennial herb 0.03 to 0.1 m high with white or pink flowers from August to September (WAH 2016). It is known from habitat comprising stony sandy loam, lateritic outcrops and winter-wet sites (WAH 2016). *Gunniopsis propinqua* is restricted to Western Australia and is known from a number of localities in the eastern part of the Austin Botanical District, and one locality in the extreme north-west of the Ashburton District. This species grows in less saline situations than its closest relative, *Gunniopsis septifraga*, favouring lateritic outcrops or sandy stony loams (Chinnock 1983).

Plate 6-3: *Gunniopsis propinqua* specimen collected from the Study Area

6.3.2 Flora of Other Significance

The EPA (2004) advises that flora species, subspecies, varieties, hybrids and ecotypes may be considered significant for reasons other than listing as a Threatened or Priority Flora taxa, and may include the following:

- a keystone role in a particular habitat for threatened taxa, or supporting large populations representing a significant proportion of the local regional population of a species;
- relic status;
- anomalous features that indicate a potential new discovery;
- being representative of the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- the presence of restricted subspecies, varieties, or naturally occurring hybrids;
- local endemism/a restricted distribution; and/or
- being poorly reserved.

Based on these parameters, one range extension, *Eremophila* sp. Plumbridge Lakes (S.G.M. Carr 534) was recorded from the Study Area. Though there are no records of this taxon in the area Andrew Brown, *Eremophila* specialist and associate researcher of the Western Australian Herbarium, confirmed that the taxon has been previously been observed in the region and is closely related to *Eremophila clarkei*. *Eremophila* sp. Plumridge Lakes (S.G.M. Carr 534) was opportunistically recorded from the haul road survey area and was noted as being uncommon.

6.4 Unknown Flora

Twenty-two (22) flora specimens collected from the Study Area could not be confidently identified to species level (**Appendix K**), due to a lack of reproductive material and/or poor flora specimen availability at the time of survey. This represents approximately 14% of the taxa recorded within the Study Area. This proportion of unknown flora is related to the timing of the survey which occurred later than what would be considered optimal (i.e. August/September), resulting in some species being recorded at the end of flowering/fruiting periods and senescing.

All but one of these (Poaceae sp.), have been assigned a confirmed genus and most have been tentatively identified to species level. None of the unknown flora taxa collected are analogous to Parks and Wildlife listed Threatened or Priority flora taxa, nor are they likely to represent flora of other significance.

6.5 Introduced Flora

No introduced flora taxa were recorded within the Study Area.

6.5.1 Weeds of National Significance

None of the flora taxa recorded from the Study Area are considered to be WoNS. No WoNS have previously been recorded from the Study Area.

6.5.2 Declared Plant Pests

None of the flora taxa recorded from the Study Area are considered to be DPPs. No DPPs have previously been recorded from the Study Area.

6.5.3 Environmental Weeds

None of the flora taxa recorded from the Study Area are considered to be Environmental Weeds. No Environmental Weeds have previously been recorded from the Study Area.

6.6 Vegetation Units

The statistical analysis of the quadrat and relevé data, and the on-ground observations, identified six super groups or broad vegetation units as occurring with the Study Area. The six super groups identified from the dendrogram output from the statistical analysis included:

- Claypan
- Outcrop and Ridges
- Mulga Woodland
- *Acacia* shrublands
- Chenopod shrublands
- *Eremophila* plains

The six super groups were further subdivided into 18 vegetation units (**Table 6-3**, **Appendix N**). The six broader groups comprised one claypan, three types of mixed *Acacia* shrubland on sandy clay plains, three types of Mulga woodland on medium and sandy clay, three on outcrop, ridges, stony rises and breakaways, three dominated by *Eremophila* found on quartz or sandy plains, and five chenopod shrublands on sandy clay plains. In addition, completely degraded areas comprising 71 ha of the Study Area (68 ha in the mine area and 3 ha in the haul road corridor) have been mapped as Disturbed.

The majority of the quadrats (and relevés) assigned neatly within the vegetation units discerned from the dendrogram output (at approximately 40% similarity). Of the 77 sites established and sampled, four (GQ08, GQFF01, GQ55 and GR08) did not neatly fit within the dendrogram output and required manual insertion into their respective vegetation units. The sites were manually fitted into the vegetation units based on the observations on the vegetation during the field survey. Where sites matched several units, the corresponding soils, landforms and geology were taken into consideration.

The flora sampling site GQ08 was an outlier in the dendrogram and was equally similar to all of the Mulga Woodlands vegetation units. However, based on vegetation structure, species composition and soils and geology, the site was most similar to vegetation unit A?paEfoEff.

The flora sampling site GQFF01 was less than 40% similar to the vegetation unit A?paAgEm, however was most closely matched to this vegetation unit. The field observations confirmed the match with this vegetation unit.

The flora sampling site GQ55 was outlier to the vegetation unit CfAfEl due to the absence of key species *Acacia fuscaneura* and *Acacia grasbyi*. The sampling site most closely aligned with this vegetation unit due to the presence of *Corymbia ferriticola, Eremophila glutinosa* and *Eremophila latrobei*.

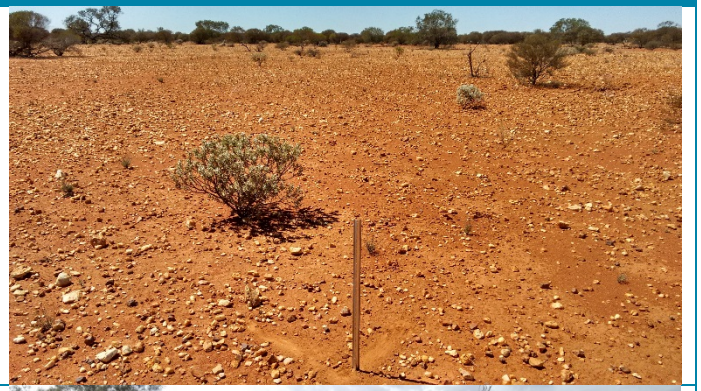
The flora sampling site GR08 was less than 40% similar to the vegetation unit CfA?ptDp, however field observations and data indicated that the site best aligned with the vegetation unit due to the presence of key species, namely *Dodonaea pachyneura* and *Acacia ? pteraneura*.

Table 6-3: Vegetation recorded within the Study Area

Vegetation Code and description	Flora Sites	Priority Flora	Area (ha)	General Condition	Photo
Claypan					
AmAtHll *Acacia mulganeura*, *Acacia tetragonophylla* and *Hakea lorea* subsp. *lorea* low isolated trees over *Eremophila fraseri* subsp. *fraseri* mid isolated shrubs mixed dead tussock grassland on heavy clay plains	GQ26 GQ53 GQ62	None recorded	**Study Area** 13 **Mine** 13 **Haul Road** <1	Good	
***Acacia* Shrublands**					
A?paA?pt *Acacia* ? *paraneura* and *Acacia* ? *pteraneura* (with or without *Grevillea berryana*, *Acacia mulganeura* and *Acacia pruinocarpa*) low open woodland over *Psydrax latifolia*, *Psydrax rigidula* and *Eremophila latrobei* tall to mid isolated shrubs over *Eremophila glutinosa*, *Ptilotus schwartzii* and *Solanum lasiophyllum* low sparse shrubland on sandy clay quartz plains	GQ31 GQ60 GQ32 GQ30 GQ47	None recorded	**Study Area** 235 **Mine** 50 **Haul Road** 185	Good	

Vegetation Code and description	Flora Sites	Priority Flora	Area (ha)	General Condition	Photo
A?paA?ptD *Acacia* ? *paraneura*, *Acacia* ? *pteraneura* and *Acacia mulganeura* low woodland over *Senna artemisioides* subsp. *helmsii*, *Dodonaea pachyneura* and *Eremophila fraseri* subsp. *fraseri* mid sparse shrubland over *Eremophila glutinosa*, *Eremophila flabellata* and *Solanum lasiophyllum* low sparse shrubland on drainage	GQ39 GQ37 GQ40	None recorded	**Study Area** 13 **Mine** 0 **Haul Road** 13	Good	
A?ptEffEfo *Acacia* ? *pteraneura* low open woodland over *Eremophila fraseri* subsp. *fraseri* and *Eremophila forrestii* mid sparse shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* low sparse shrubland with *Aristida contorta* sparse tussock grassland on orange sandy medium clay plains	GQ01 GQ33 GQ35	None recorded	**Study Area** 58 **Mine** 11 **Haul Road** 46	Good	

Vegetation Code and description	Flora Sites	Priority Flora	Area (ha)	Condition	Photo
Mulga Woodlands					
A?paAprPo *Acacia ?* paraneura and *Acacia pruinocarpa* (with or without *Acacia fuscaneura*) low closed woodland over *Eremophila fraseri* subsp. *fraseri* mid sparse shrubland over *Ptilotus obovatus*, *Eremophila flabellata* and *Solanum lasiophyllum* low open to sparse shrubland on medium clay broad drainage	GR09 GQ20 GQ19 GQ23	None recorded	**Study Area** 85 **Mine** 84 **Haul Road** 1	Good	
A?paEfoEff *Acacia ? paraneura*, *Acacia mulganeura* and *Acacia tetragonophylla* low woodland over *Eremophila forrestii* and *Eremophila fraseri* subsp. *fraseri* mid open to sparse shrubland over *Eremophila flabellata*, *Solanum lasiophyllum* and *Ptilotus obovatus* low open to sparse shrubland with *Eragrostis eriopoda* sparse tussock grassland on orange sandy clay plains.	GQ07 GQ46 GQ04 GQ03 GQ24 GQ08 GQ09 GQ29 GQ06 GQ12 GQ14 GQ17 GQ21	None recorded	**Study Area** 931 **Mine** 931 **Haul Road** 0	Good	

Vegetation Code and description	Flora Sites	Priority Flora	Area (ha)	Condition	Photo
A?paEfoEffD *Acacia ? paraneura*, *Acacia mulganeura* and *Acacia tetragonophylla* low woodland over *Eremophila* fraseri subsp. *fraseri* with occasional *Eremophila forrestii* mid open to sparse shrubland over *Solanum lasiophyllum* and *Ptilotus obovatus* low open to sparse shrubland on orange sandy clay broad drainage	GQ10 GQ16 GQ05 GQ13 GQ15 GQ25 GQ02 GQ18	None recorded	**Study Area** 455 **Mine** 455 **Haul Road** <1	Good	
***Eremophila spathulata* on quartz**					
A?ptEspEss *Acacia ? pteraneura* low open woodland over *Eremophila spathulata* and *Eremophila spectabilis* subsp. *spectabilis* mid sparse shrubland over *Eremophila compacta* subsp. *compacta*, *Ptilotus schwartzii* and *Ptilotus roei* low sparse shrubland on orange sandy medium clay plains	GQ34 GQ36	None recorded	**Study Area** 41 **Mine** 0 **Haul Road** 41	Good	
AprEsp *Acacia pruinocarpa, Acacia grasbyi* and *Acacia tetragonophylla* tall sparse shrubland over *Eremophila spathulata, Eremophila macmillaniana* and *Ptilotus rotundifolius* mid sparse shrubland over *Solanum lasiophyllum* low sparse shrubland on stony quartz and ironstone plains	GQ22 GQ45 GQ50	None recorded	**Study Area** 144 **Mine** 41 **Haul Road** 103	Good	

Vegetation Code and description	Flora Sites	Priority Flora	Area (ha)	Condition	Photo
EsEm *Eremophila spathulata*, *Eremophila macmillaniana* and *Senna* sp. Meekatharra (E. Bailey 1-26) mid sparse shrubland over *Ptilotus obovatus* low sparse shrubland on orange medium clay plains	GQ28 GQ27 GR03	None recorded	**Study Area** 82 **Mine** 78 **Haul Road** 4	Good	
Chenopod Shrublands					
A?ptEffSaa *Acacia ? pteraneura* low open woodland over *Eremophila fraseri* subsp. *fraseri* and *Senna artemisioides* subsp. x *artemisioides* mid sparse shrubland over *Sclerolaena densiflora* sparse dwarf chenopod shrubland on yellow brown clay loam and brown sandy clay plains	GQ54 GRFF01	None recorded	**Study Area** 12 **Mine** 0 **Haul Road** 12	Good	
SsMPnMc *Senna* sp. Meekatharra (E. Bailey 1-26) and *Ptilotus nobilis* mid isolated shrubs over *Maireana carnosa*, *Sclerolaena cuneata* and *Sclerolaena densiflora* sparse dwarf chenopod shrubland on clayey sand or heavy clay plains	GR02 GQ52 GR13	*Gunniopsis propinqua* (P3)	**Study Area** 21 **Mine** 7 **Haul Road** 14	Good	

Vegetation Code and description	Flora Sites	Priority Flora	Area (ha)	Condition	Photo
EffMcSd *Eremophila fraseri* subsp. *fraseri* mid isolated shrubs over *Ptilotus obovatus* low sparse shrubland over *Maireana carnosa* and *Sclerolaena densiflora* dwarf chenopod shrubland on orange medium to heavy clay plains	GQ49 GQ11 GQ61	None recorded	**Study Area** 52 **Mine** 52 **Haul Road** 0	Good	
EmAcSd *Eremophila macmillaniana* and *Senna* sp. Meekatharra (E. Bailey 1-26) mid isolated shrubs over *Ptilotus obovatus* low isolated shrubs with *Aristida contorta* sparse tussock grassland over *Sclerolaena densiflora* and *Maireana carnosa* dwarf chenopod shrubland on orange medium clay plains	GR10 GQ59 GR05	*Gunniopsis propinqua* (P3)	**Study Area** 28 **Mine** 0 **Haul Road** 28	Good	
AtEmSd *Acacia tetragonophylla* tall isolated shrubs over *Eremophila macmillaniana*, *Eremophila fraseri* subsp. *fraseri* and *Senna* sp. Meekatharra (E. Bailey 1-26) mid isolated shrubs over *Ptilotus obovatus* and *Solanum lasiophyllum* low isolated shrubs with *Aristida contorta* sparse tussock grassland over *Sclerolaena densiflora* dwarf chenopod shrubland orange sandy medium clay or clay loam plains	GQ48 GQ51 GQ43 GQ42 GR12	None recorded	**Study Area** 69 **Mine** 8 **Haul Road** 62	Good	

Vegetation Code and description	Flora Sites	Priority Flora	Area (ha)	Condition	Photo
Outcrops and Ridges					
A?paAgEm *Acacia ? paraneura* and *Acacia grasbyi* low open woodland over *Eremophila macmillaniana* mid sparse shrubland over *Eremophila glutinosa* and *Ptilotus obovatus* low sparse shrubland over *Sclerolaena diacantha* dwarf chenopod shrubland low stony ridges	GR04 GQ44 GR07 GQFF01	*Stenanthemum mediale* (P1)	**Study Area** 26 **Mine** 0 **Haul Road** 26	Very Good	
CfAfEl *Corymbia ferriticola*, *Acacia fuscaneura* and *Acacia grasbyi* low open woodland over *Eremophila latrobei* and *Dodonaea pachyneura* mid sparse shrubland over *Cymbopogon ambiguus* sparse tussock grassland on rocky outcrops and ridges	GQ58 GQ38 GR01 GQ41 GQ57 GQ55	*Stenanthemum mediale* (P1)	**Study Area** 22 **Mine** 0 **Haul Road** 22	Very Good	
CfA?ptDp *Corymbia ferriticola*, *Acacia ? pteraneura* and *Acacia grasbyi* low open woodland over *Dodonaea pachyneura* mid sparse isolated shrubs over *Eremophila flabellata* low isolated shrubs on outcrops and adjacent plains	GR08 GR06 GQ56 GR11	*Stenanthemum mediale* (P1)	**Study Area** 10 **Mine** 0 **Haul Road** 10	Very Good	

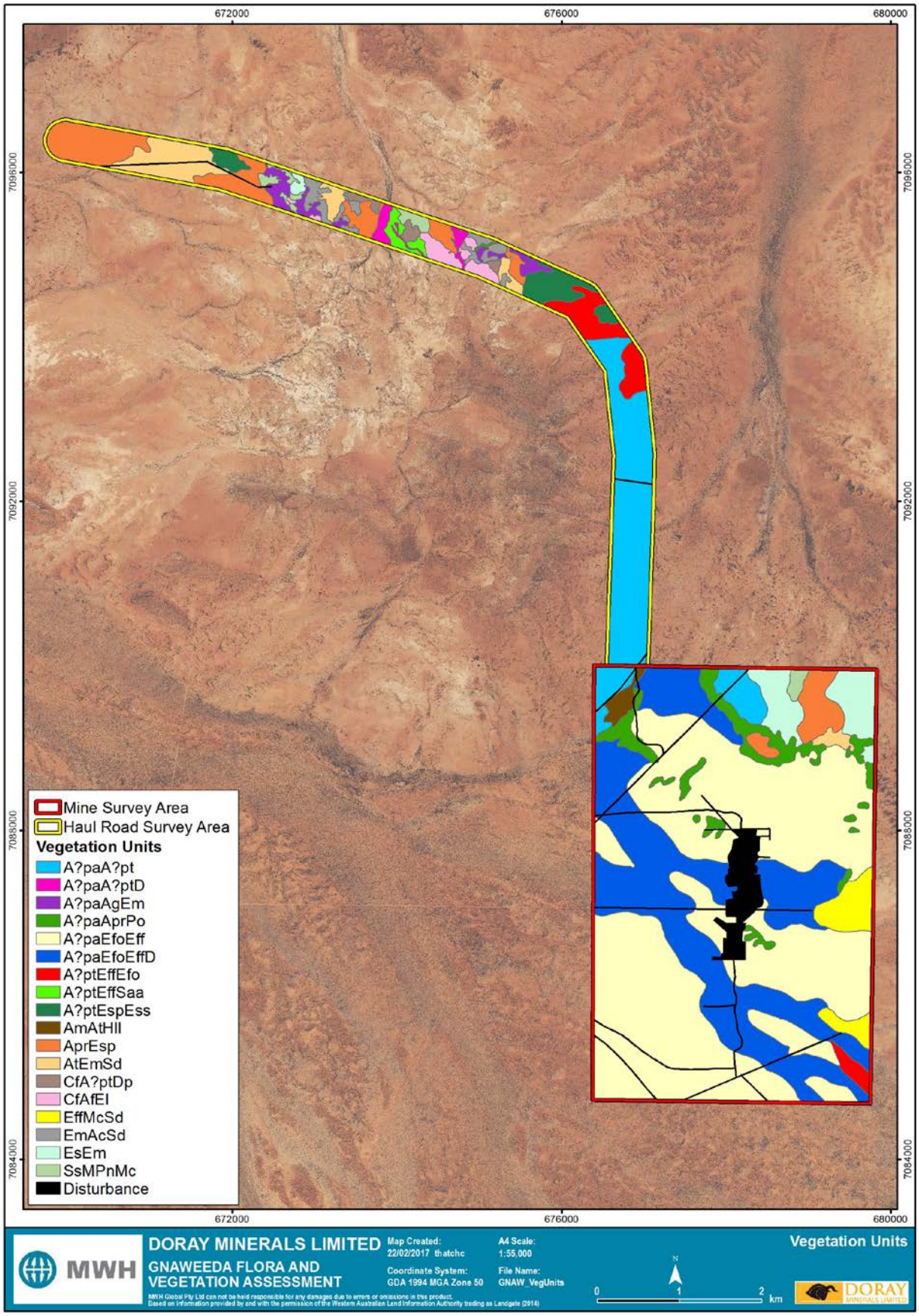


Figure 6-3: Vegetation unit mapping of the Study Area (Overview)

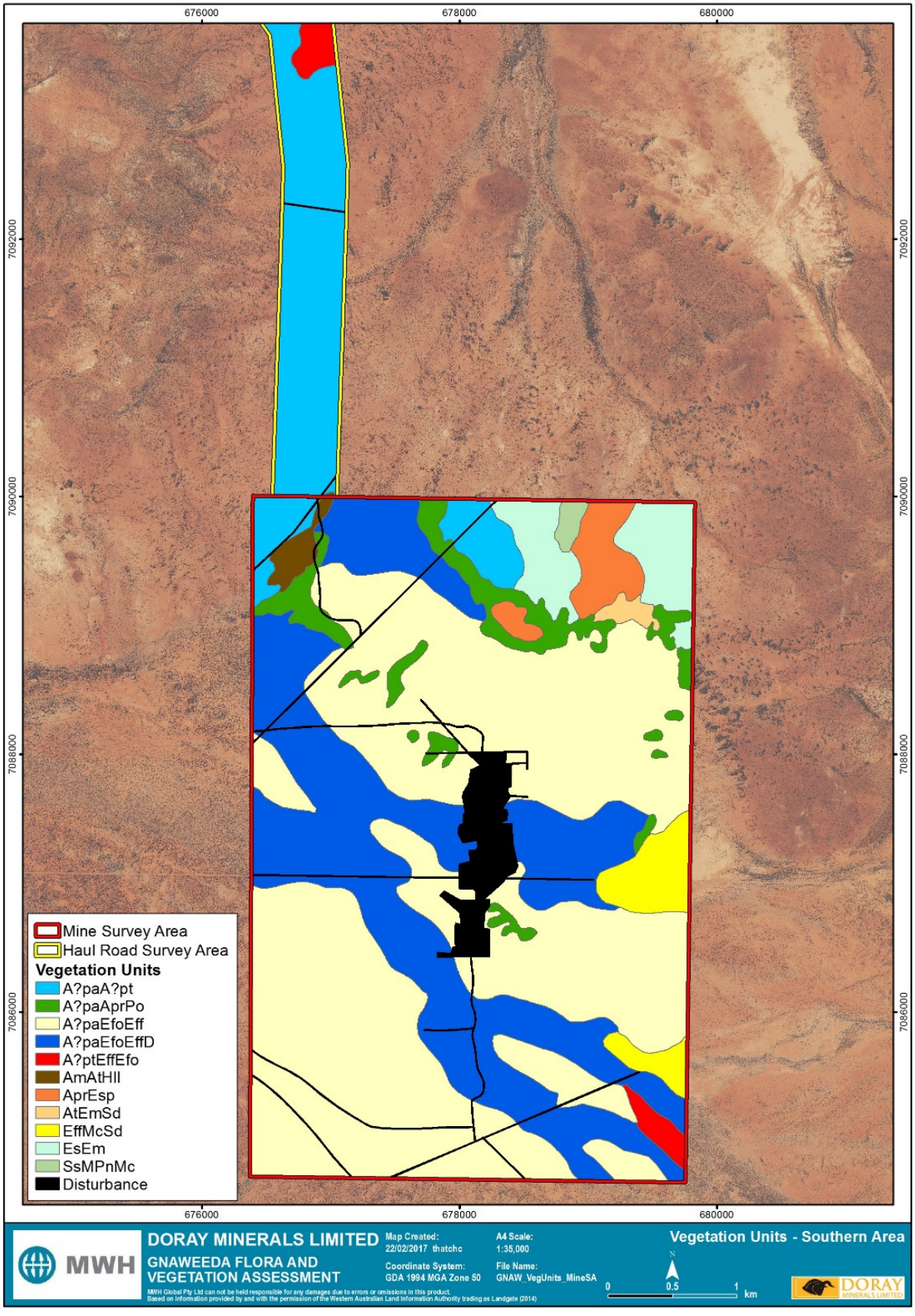


Figure 6-4: Vegetation unit mapping for the mine survey area

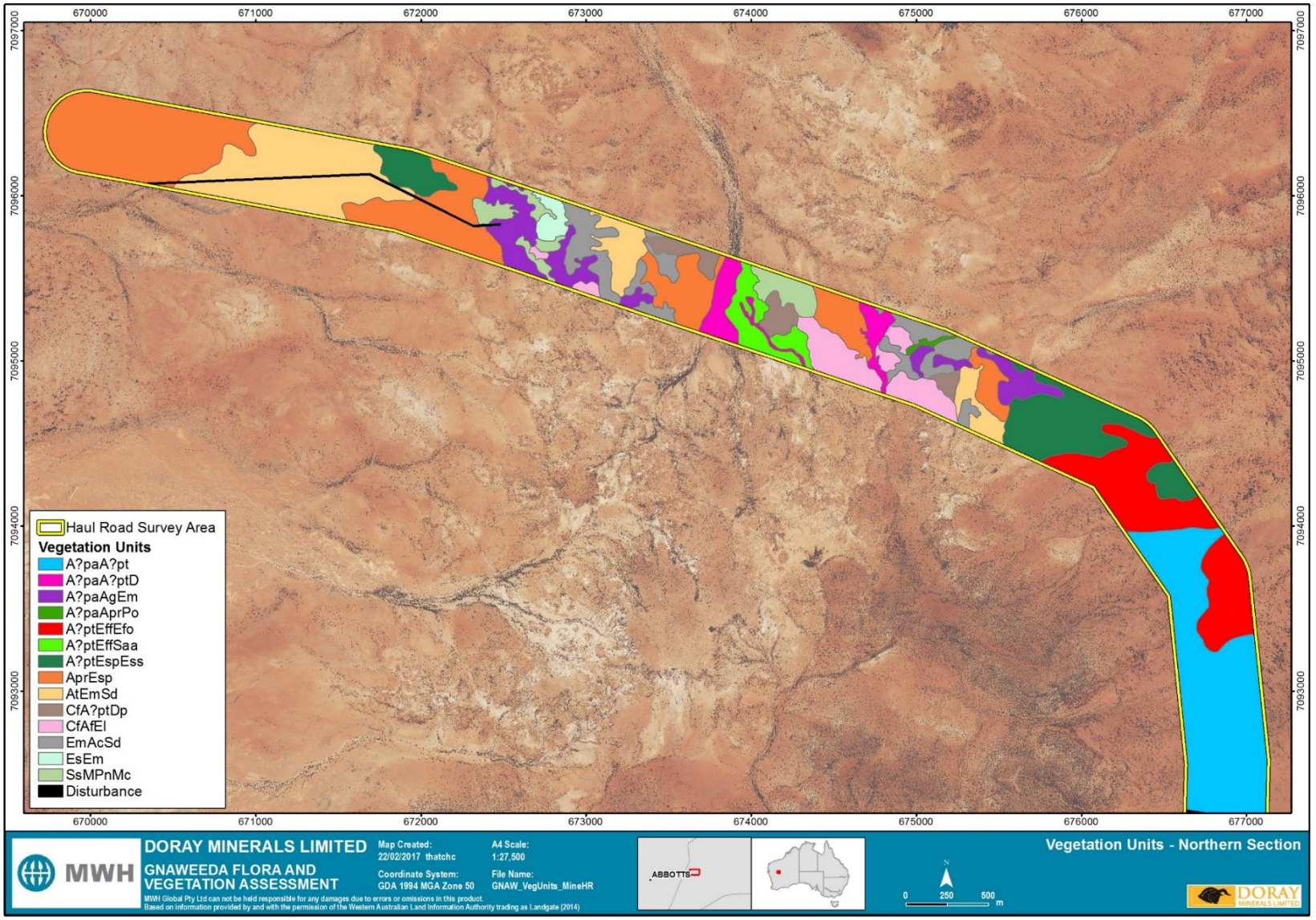


Figure 6-5: Vegetation unit mapping for the haul road survey area

6.7 Vegetation of Significance

None of the vegetation units within the Study Area are analogous to any TECs under the EPBC Act, or listed by Parks and Wildlife, which qualify for special protection.

Potentially threatened ecological communities that do not meet the criteria for a TEC are assigned a PEC status. These communities are not protected under environmental legislation, however it is best practice to avoid disturbance to these areas. There were no PECs directly related to terrestrial vegetation recorded within the Study Area. The vegetation units described from the Study Area are not considered to represent any PECs known to occur in the Murchison bioregion.

The EPA (2004) advises that vegetation may be considered to be of significance for a range of reasons, other than a listing as a TEC or a PEC, including:

- vegetation extent being below a threshold level;
- scarcity;
- unusual species;
- novel combinations of species;
- a role as a refuge;
- a role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;
- being representative of the range of a unit (particularly a good local and/or regional example of a unit in 'prime' habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range); and/or
- a restricted distribution.

There were no vegetation units recorded from within the Study Area that are considered to be of regional significance. Five vegetation units were considered to be of local significance within the Study area (**Table 6-4**). These vegetation units are considered significant for supporting Priority Flora. The five units were recorded from the Outcrops and Ridges and Chenopod Shrublands. These broad groups mainly occurred along the haul road survey area, with minor occurrences in the mine survey area. The conservation significant flora associated with these vegetation units were recorded within the haul road survey area.

Table 6-4: Locally significant vegetation units

Vegetation unit	Survey Area	Study Area coverage (ha / %)	Comment
SsMPnMc *Senna* sp. Meekatharra (E. Bailey 1-26) and *Ptilotus nobilis* mid isolated shrubs over *Maireana carnosa*, *Sclerolaena cuneata* and *Sclerolaena densiflora* sparse dwarf chenopod shrubland on clayey sand or heavy clay plains	Haul Road & Mine	21 / 1	Supports a populations of *Gunniopsis propinqua* (P3)

Vegetation unit	Survey Area	Study Area coverage (ha / %)	Comment
EmAcSd *Eremophila macmillaniana* and *Senna* sp. Meekatharra (E. Bailey 1-26) mid isolated shrubs over *Ptilotus obovatus* low isolated shrubs with *Aristida contorta* sparse tussock grassland over *Sclerolaena densiflora* and *Maireana* carnosa dwarf chenopod shrubland on orange medium clay plains	Haul Road	28 / 1	Supports a populations of *Gunniopsis propinqua* (P3)
A?paAgEm *Acacia* ?*paraneura* and *Acacia grasbyi* low open woodland over *Eremophila macmillaniana* mid sparse shrubland over *Eremophila glutinosa* and *Ptilotus obovatus* low sparse shrubland over *Sclerolaena diacantha* dwarf chenopod shrubland low stony ridges	Haul Road	26 / 1	Supports a population of *Stenanthemum mediale* (P1)
CfAfEl *Corymbia ferriticola*, *Acacia fuscaneura* and *Acacia grasbyi* low open woodland over *Eremophila latrobei* and *Dodonaea* pachyneura mid sparse shrubland over *Cymbopogon ambiguus* sparse tussock grassland on rocky outcrops and ridges	Haul Road	22 / 1	Supports a population of *Stenanthemum mediale* (P1)
CfA?ptDp *Corymbia ferriticola*, *Acacia* ? *pteraneura* and *Acacia grasbyi* low open woodland over *Dodonaea pachyneura* mid sparse isolated shrubs over *Eremophila flabellata* low isolated shrubs on outcrops and adjacent plains	Haul Road	10 / <1	Supports a population of *Stenanthemum mediale* (P1)

In addition to the four locally significant vegetation units (supporting priority flora taxa), 15 of the 18 vegetation units could be considered to be locally restricted in distribution (**Table 6-5**). Each of the 15 vegetation units represent less than 10% of the Study Area, while eight of the 15 vegetation units are mapped as occurring across 1% or less of the Study Area.

Table 6-5: Vegetation units with restricted distribution in the Study Area

Vegetation Unit	Study Area		Mine survey area[1]		Haul Road survey area[2]	
	ha	%	ha	%	ha	%
A?paA?ptD	13	1	0	0	13	2
A?paAgEm	26	1	0	0	26	4
A?paAprPo	85	4	84	5	1	<1
A?ptEffEfo	58	2	11	1	46	8
A?ptEffSaa	12	1	0	0	12	2
A?ptEspEss	41	2	0	0	41	7
AmAtHll	13	1	13	1	<1	<1
AprEsp	144	6	41	2	103	18
AtEmSd	69	3	8	<1	62	11
CfA?ptDp	10	<1	0	0	10	2
CfAfEl	22	1	0	0	22	4
EffMcSd	52	2	52	3	0	0
EmAcSd	28	1	0	0	28	4

Vegetation Unit	Study Area		Mine survey area[1]		Haul Road survey area[2]	
	ha	%	ha	%	ha	%
EsEm	82	3	78	4	4	1
SsMPnMc	21	1	7	<1	14	2
Totals	624	26	242	16	382	67

1: Hectare and percentage values have been calculated based on the total extent of the Mine survey area, 1,799 ha

2: Hectare and percentage values have been calculated based on the total extent of the Haul Road survey area, 570 ha

No phreatophytic flora taxa were recorded from the Study Area, indicating that there were no groundwater dependant vegetation types within the Study Area.

6.8 Vegetation Condition

The vegetation condition of the Study Area ranged from Very Good to Completely Degraded, with the majority assessed as Good (95%) (**Figure 6-6**). The areas assessed as Good were those that had been subjected to pastoral grazing, historical selective logging and minor access tracks. Very Good areas (2%) were restricted to the outcrops and ridges where only minor grazing had occurred. Completely Degraded areas (3%) comprised those where exploration activities were occurring at the time of survey, and along frequently used exploration and pastoral tracks.

The low diversity of ephemeral species within the Study Area is related to the timing of the survey as opposed to historical and current disturbances. Approximately 96% of the vegetation within the mine survey area was considered to be in Good condition, while the remaining 4% of the vegetation within the mine survey area was considered to be Completely Degraded. A significant portion (89%) of the vegetation within the haul road survey area was considered to be in Good condition, while the remaining vegetated area within the haul road survey area was in Very Good condition (10%). The remainder of the haul road, comprising access tracks, was Completely Degraded (1%).

The most prevalent disturbances within the Study Area were areas cleared for exploration drilling and associated tracks, pastoral tracks and fencing, and cattle grazing and trampling. The condition of the vegetation is consistent with what is expected in the Murchison bioregion. The historical and current land uses of the Murchison bioregion have shaped the condition of the vegetation through:

- Pastoralism:
  - Stock grazing and trampling;
  - Clearing for tracks and fence lines; and
  - Feral herbivores (i.e. goats); and
- Mineral exploration and mining:
  - Exploration drill lines and associated tracks.

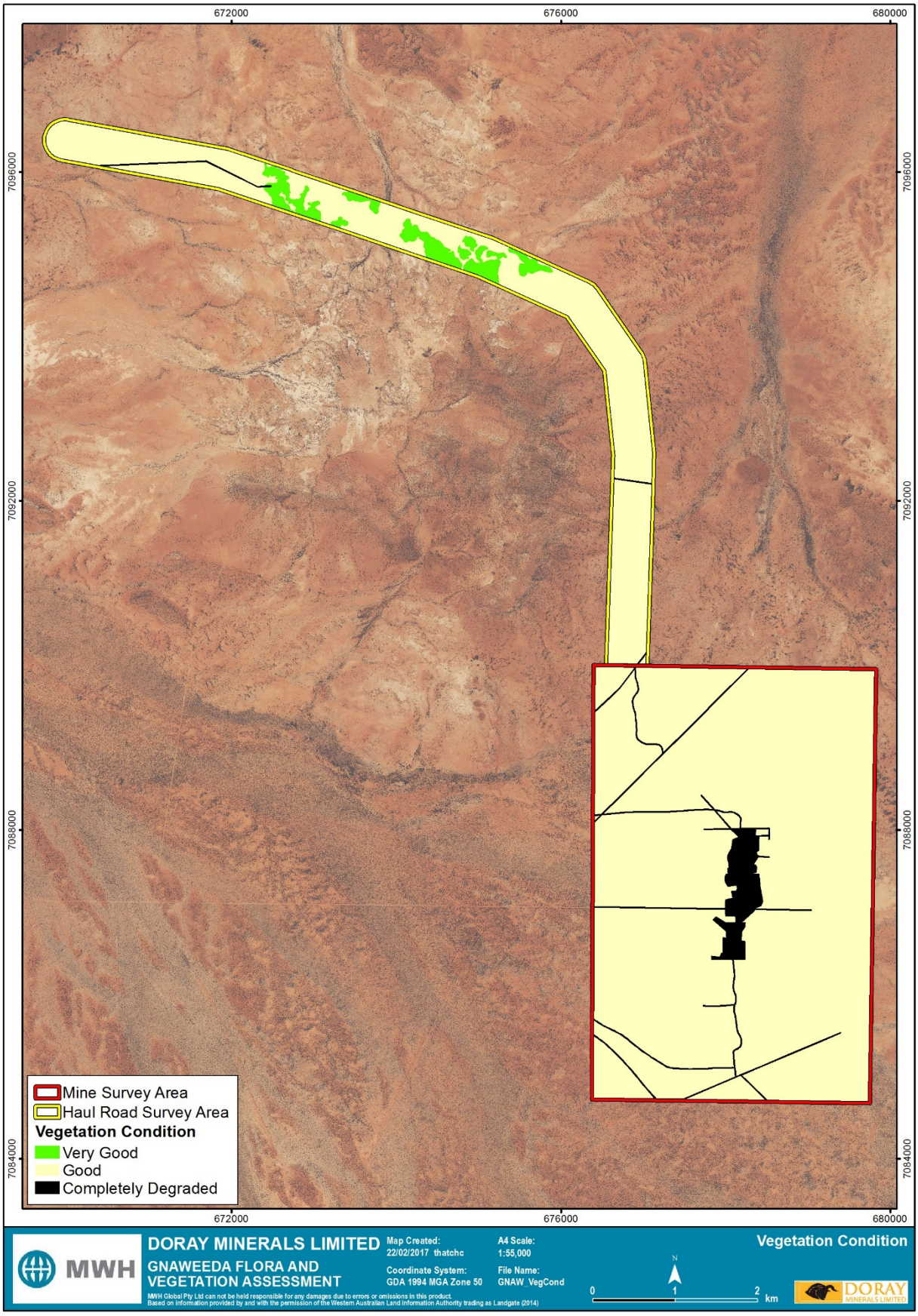


Figure 6-6: Vegetation condition of the Study Area

7 Survey Limitations

There are a number of possible limitations and constraints that can impinge on the adequacy of vegetation and flora surveys (EPA 2004, EPA and DPaW 2015). The limitations of this survey are presented in accordance with EPA Guidance Statement No. 51 (EPA 2004) and the Technical Guide (EPA and DPaW 2015) (**Table 7-1**).

Table 7-1: Statement of botanical survey limitations

Limitation	Constraint	Comment
Level of survey	No	A Level 2 survey was considered appropriate for this project due to the moderate to high impact of the proposal and the project's location within the Murchison region as per EPA Guidance Statement 51 (2004).
Competency/experience of the consultant(s) carrying out the survey, including experience in the bioregion	No	The vegetation and flora survey was conducted by Megan Stone and Sophie Fox who are both experienced in undertaking Level 2 flora and vegetation surveys and the Murchison bioregion. Flora specimens were identified by experienced taxonomist Sharnya Thompson at the WA Herbarium.
Availability of contextual information at a regional and local scale	No	Government database searches provided good contextual information on the Study Area and region prior to conducting the survey. Availability of data from previous studies within the Study Area and nearby was also appropriate.
Completeness and mapping reliability	No	The vegetation unit mapping reliability for the mine survey area is considered high, while the mapping reliability for the haul road is considered to be moderate. The lower reliability for the haul road is related to the complexity of the vegetation present amongst the rocky ridges, outcrops and breakaways.
Proportion of flora recorded and/or collected, any identification issues	No	A total of 151 vascular flora taxa were recorded within the Study Area, comprising only native flora taxa, representing 28 families and 55 genera. Of these 22 taxa (14%) could not be confidently identified to species or infraspecies level due to lack of flowering or fruiting material. This is not considered a constraint as all but one of these (Poaceae sp.), have been assigned a confirmed genus and most have been tentatively identified to species level. None of the unknown flora taxa collected are analogous to Parks and Wildlife listed Threatened or Priority flora taxa, nor are they likely to represent flora of other significance.
Scope (floral groups that were sampled; were some sampling methods not able to be employed?)	No	All vascular groups present within quadrats sampled during the survey were recorded. It is thus considered that the scope has been met.
Effort and extent (appropriate area fully surveyed)	No	The flora and vegetation survey was undertaken during a single phase survey during which all work was completed. The entire Study Area was not grid searched for Priority flora as the Study Area was large and the final alignment of the proposed haul road unknown, however targeted searching was conducted in preferred habitat. A total of 77 flora sites were surveyed across the Study Area, with approximately 0.03 sites completed per hectare. This was considered adequate for ensuring that at least three flora sites were sampled in most vegetation types, and for ensuring that coverage across the site was sufficient.

Limitation	Constraint	Comment
Access throughout the Study Area	No	Access to the Mine survey area was considered adequate for this survey. Access was limited along the haul road survey area as there were few existing tracks available to drive on. This is not considered to be a limiting factor in the preparation of this document, excluding the mapping reliability (discussed above).
Suitable timing/weather/season	Yes	The timing of the survey was considered appropriate for a level 2 flora and vegetation survey as it was undertaken following the highest rainfall period for the year. Despite this, annual and ephemeral flora taxa were observed that could not be identified as they had already senesced or finished their reproductive cycle. It is likely that additional annual and ephemeral taxa would be observed immediately following the high rainfall season.
Disturbances that may have affected the survey	No	No disturbances affected the results of the survey. Areas of disturbance associated with clearing for exploration activities and pastoral activities were recorded within the Study Area.

8 Discussion

8.1 Discussion

8.1.1 Flora

The Western Murchison subregion mainly consists of Mulga low woodland, often rich in ephemerals (Desmond *et al.* 2001). Excluding the high diversity of ephemerals, the Western Murchison subregion is not known to support high biological diversity, with rare features centred on calcrete aquifers (subterranean aquatic fauna) (Desmond *et al.* 2001). The low biological diversity is reflective of the Study Area, with only 151 native vascular flora recorded during the field surveys. A low diversity of ephemerals were recorded from the Study Area, highlighted by only five members of the Asteraceae (daisy) family recorded, with four considered to be annual or ephemeral taxa. The majority of the ephemeral taxa was considered to be dead or dying which limited the collection and recording of the ephemeral taxa.

The total number of native vascular flora taxa from the Study Area is only slightly less than the 170 native vascular flora recorded by Mattiske Consulting (2011) at the Andy Well mine site. In addition, the sampling intensity across the Andy Well mine site and the Study Area are comparable, with 0.08 and 0.03 sites per hectare, respectively.

When a curve approaches an asymptote it suggests that sampling effort has been sufficient to adequately collect the species comprising the floral assemblage at the locations sampled (Thompson and Withers 2003). The value at which the curve asymptotes can also be used as an approximate measure of the total size of the species complement at that location (Thompson *et al.* 2003).

The species accumulation curve for the Study Area indicated that approximately 75% (Chao1 and Chao 2) to 106% (Michaelis-Menton) of the expected native vascular flora have been collected. Given that the species accumulation curve and the richness estimators are approaching asymptote, it suggests that additional survey work would more than likely record additional vascular flora taxa. The additional vascular flora taxa would include ephemeral taxa that seem to be under-represented in the flora inventory.

The desktop assessment indicated that two threatened taxa, both perennial shrubs, *Eremophila rostrata* subsp. *rostrata* and *Pityrodia augustensis*, could potentially occur within the Study Area. As expected, the field survey did not record the presence of the two threatened taxa, nor any other listed threatened flora.

Two Parks and Wildlife priority listed taxa, *Stenanthemum mediale* (P1) and *Gunniopsis propinqua* (P3), were recorded from the Study Area during the field survey. The two priority listed taxa were recorded from the haul road survey area. No conservation significant taxa were recorded from the mine survey area.

Stenanthemum mediale was recorded from six locations, totalling 106 individuals, within the haul road survey area. The Western Australian Herbarium has 22 specimens lodged with them (WAH 2017). The majority of the specimens and records are from the east and southeast of Meekatharra near the ex-Kaluwiri Pastoral Lease. All records of *Stenanthemum mediale* occurred in association with the low outcropping breakaways that occurred exclusively within the haul road survey area. According to the specimen records, there are no populations or individuals recorded from a reserve managed for conservation by Parks and Wildlife (WAH 2017).

A significant population of *Stenanthemum mediale* is known to occur north of Cue with approximately 137 individuals recorded from 47 point locations (Coffey Environments 2013a). This population along with the six locations of *Stenanthemum mediale* within the Study Area fill in a distributional gap for the conservation significant taxon in the Murchison bioregion. The known population distribution extends from Mount Magnet in the south-west to Mount Gould in the north-west, across to Wiluna in the north-east and Sandstone in the south-east (WAH 2017).

Stenanthemum mediale (P1) was recorded from the Outcrops and Ridges broad group. The supplementary survey undertaken in November 2016 was able to further delineate the locations and individuals within the Study area. Additional populations are expected to occur within the Study Area and immediate surrounds to the north and south of the Haul Road survey area amongst the outcropping, breakaways and stony ridges.

Gunniopsis propinqua was recorded from two locations within the Chenopod Shrubland broad habitat in the north-western end of the haul road survey area. The Western Australian Herbarium has 17 specimens lodged with them (WAH 2017). According to the specimen information, *Gunniopsis propinqua* extends from Paraburdoo in the Pilbara bioregion to Laverton in Murchison bioregion, some 800 km. Of the 17 specimens lodged, two were collected from lands managed for conservation by Parks and Wildlife (WAH 2017).

The two records of *Gunniopsis propinqua* were recorded from quadrats, with both specimens noted as being dried and in the process of senescing. Positive identifications were made from seed that were still present within the drying fruits. Additional populations have previously been recorded from the Cue region (Coffey Environments 2013a, b) from stony Chenopod shrublands and stony loams. Further targeted surveys during a more optimal survey period (6 to 8 weeks after sufficient rainfall) may increase the known distribution of this conservation significant taxon in the Study Area.

No introduced taxa were recorded from the Study Area during the field surveys. Mattiske Consulting (2011) identified two introduced taxa, **Bidens bipinnata* and **Oxalis corniculata*, from the Andy Well mine site. An additional taxon, *Portulaca oleracea*, was also recorded as a weed from the Andy Well mine site, however this taxon is no longer considered to be a weed. There is the potential that the two weed species may occur within the haul road survey area adjacent to the Andy Well mine site.

Additional surveys undertaken during a time that would be considered more optimal (i.e. six weeks post significant rainfall events) may potentially record additional introduced taxa with the Study Area.

8.1.2 Vegetation

The dendrogram output from the statistical analysis indicated that six super or broad groups were present: Claypan; Outcrops and Ridges; Mulga Woodland; *Acacia* Shrublands; *Eremophila* plains; and Chenopod shrublands. The six broad groups were further delineated into 18 discrete vegetation units. The 18 discrete vegetation units are consistent with vegetation units known to occur in the Murchison bioregion.

The Mulga woodlands predominantly occurred within the mine survey area, while the *Acacia* Shrublands, Outcrops and Ridges, *Eremophila* plains and Chenopod Shrublands vegetation units predominantly occurred within the haul road survey area. The Claypan vegetation unit (AmAtHll) occurred in the north-west of the mine survey area with a minor portion occurring at the southern end of the haul road survey area adjoining the mine survey area.

The vegetation units delineated from the Mulga Woodlands and *Acacia* Shrublands are considered to be well represented within the Murchison bioregion. The remaining vegetation units recorded from the Claypans, Outcrops and Ridges, *Eremophila* Plains and Chenopod Shrublands broad groups are not as well represented within the Murchison Region. However they are not considered to be regionally significant, with numerous occurrences of similar composition and structure recorded from projects between Cue and the Andy Well mine site (Coffey Environments 2013a, b, Mattiske Consulting 2011, MWH 2015a, b, 2016a, b).

Mattiske Consulting (2011) identified ten plant communities (consistent with vegetation units) from the Andy Well mine site. Due to the timing of the Mattiske Consulting (2011) as opposed to this survey, the rainfall recorded in the three months preceding the surveys and the fact that the *Acacia aneura* complex was still undergoing revision in 2011 (Maslin and Reid 2012), it is difficult to make any strong comparisons between the results of the two surveys. In consideration of the above, the Mulga woodlands from this survey are still considered to be representative of the Woodlands described in Mattiske Consulting (2011). The Mulga woodland groups support an upper storey of *Acacia aneura* and its close relatives over *Eremophila* species mid storey over a low shrubland or open grassland. Mattiske Consulting (2011) did not record any Outcrops and Ridges, Claypans or Chenopod Shrublands vegetation units.

Five vegetation units, were considered to be of local significance within the Study area (**Table 6-4**). These vegetation units are considered significant for supporting the Priority Flora taxa *Stenanthemum mediale* (P1) and *Gunniopsis propinqua* (P3). The five units were recorded from the Outcrops and Ridges, and Chenopod Shrublands broad groups.

The five vegetation units occurred in association with, or in close association with rocky outcrops, breakaways and ridges. The outcrops, breakaways and ridges consisted of decaying granite and laterite. The occurrence of the priority taxa on the down slope sides of the outcrops, breakaways and ridges suggests the migration of material from the granite and laterite and the formation of clay based substrate provides an environment suitable for the priority taxa.

In addition to the five locally significant vegetation units (supporting priority flora taxa), 15 of the 18 vegetation units could be considered to be locally restricted in distribution (**Table 6-5**). Each of the 15 vegetation units represent less than 10% of the Study Area, while eight of the 15 vegetation units are mapped as occurring across 1% or less of the Study Area. The restricted distribution across the Study Area suggests that the vegetation may be locally restricted in the landscape. This is particularly pertinent for the vegetation units (A?paAgEm, CfAfEl and CfA?ptDp) within the Outcrops and Ridges broad group. Rocky outcrops, ridges and breakaways are known to support significant flora in the Murchison region, emphasised by the presence of *Stenanthemum mediale* (P1) within vegetation units CfA?ptDp, A?paAgEm and CfAfEl.

Aerial imagery and information provided by Doray indicates that the Outcrops and Ridges broad group continues north and south of the Haul Road survey Area. It is anticipated that the restricted vegetation units from this broad group would be recorded further to the north and south of the haul road survey area. The vegetation units delineated from the Claypan, *Eremophila* Plains and Chenopod Shrublands broad groups were also restricted within the Study Area. Although locally restricted in distribution within the Study Area, similar habitats, and the associated vegetation, occurs outside of the Study Area, based on aerial imagery.

Vegetation condition within the Study Area ranged from Very Good to Completely Degraded, with the majority being considered to be in Good condition. Disturbances identified within the Study Area are consistent with the Murchison bioregion, including pastoral activities, and mining exploration and operations.

The vegetation was noted as having a consistent structure across most of the Study Area indicating that disturbances associated with over-grazing has been minor. This is supported by anecdotal evidence from the Andy Well site operators that indicated that feral goat numbers had drastically fallen over the last few years with the decline in rainfall.

The field survey was planned for and undertaken during what would be expected to be within the optimal time of the year according to EPA (2004), that is, following the highest rainfall period in the bioregion for the year. In the Eremaean Province the main rainfall period is sporadic and varies from year to year EPA (2004). In 2016 the high rainfall months were June and July, with a smaller amount received in August. While an October survey was considered appropriate for the level 2 survey the timing could be considered sub-optimal because no significant rainfall (i.e. greater than 30 mm) was received at the Meekatharra

Airport weather station (no. 7045) within six weeks of the field survey. Additionally, there were large gaps between consistent rainfall periods (multiple days of rain). The sub-optimal weather conditions were also evident in the lack or annual and ephemeral taxa recorded from the Study Area. This shortfall in the annual and ephemeral taxa is not considered to reduce the overall condition of the vegetation.

9 Conclusion

The floristic composition and diversity recorded from the Study Area was typical of the Western Murchison subregion. Species diversity was slightly lower than reported in a previous survey overlapping parts of the Study Area, however this was likely influenced by the timing of the survey, evident by the low number of ephemeral flora taxa recorded.

No Threatened flora were recorded from the Study Area. Two Priority flora taxa *Stenanthemum mediale* (P1) and *Gunniopsis propinqua* (P3), and one range extension *Eremophila* sp. Plumbridge Lakes (S.G.M. Carr 534), were recorded from the haul road survey area. No priority flora taxa were recorded from the mine survey area. No introduced flora taxa (weeds) were recorded.

The vegetation broadly comprised *Acacia* Shrublands, Mulga Woodlands, *Eremophila* Plains, Chenopod Shrublands, Outcrops and Ridges, and Claypans, typical of the Western Murchison subregion. Five vegetation units, recorded from the Outcrops and Ridges and Chenopod shrublands, were considered to be of local significance as they supported populations of Priority Flora. The five vegetation units considered to be locally significant primarily occurred along the haul road survey area, with minor occurrences within the mine survey area. In addition, 15 vegetation units could be considered locally significant, being mapped as occurring across less than 10% of the Study Area, while eight of the 15 vegetation units were mapped as occurring across 1% or less of the Study Area. The restricted distribution across the Study Area suggests that the vegetation may be locally restricted in the landscape.

Vegetation condition ranged from Very Good to Completely Degraded, with the majority considered to be in Good condition. Disturbances observed were associated with pastoral activities, and mineral projects and exploration.

10 Glossary

Acronym	
BAM Act	*Biosecurity and Agriculture Management Act 2007* (Western Australia)
BOM	Bureau of Meteorology
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFWA	Department of Food and Agriculture Western Australia
DOTEE	Department of the Environment and Energy (Commonwealth)
Parks and Wildlife	Department of Parks and Wildlife (Western Australia)
DPP	Declared Plant Pest
EIA	Environmental Impact Assessment
EPA	Environmental Protection Authority (Western Australia)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
GDE	Groundwater Dependent Ecosystem
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for Conservation of Nature
MWH	MWH Australia Pty Ltd
Doray	Doray Minerals Limited
NRIC	National Resource Information Centre
NVCP	Native Vegetation Clearing Permit
NVIS	National Vegetation Information System
Opportunistic	A species recorded from non-systematic sampling methods
P1	Priority 1
P2	Priority 2
P3	Priority 3
P4	Priority 4
PEC	Priority Ecological Community
Study Area	The area in which the flora and vegetation study was conducted.
Quadrats	A method used during the field survey of the Study Area involving the collection of flora and vegetation conditio
Disturbance Footprint	The proposed disturbance area in which the Project will be developed within
Relevé	A method used during the field survey of the Study Area involving the collection of flora and vegetation conditio
TEC	Threatened Ecological Community
UCL	Unallocated Crown Land
Vegetation Condition	As per Trudgen 1988 (**Appendix I**)
WAH	Western Australian Herbarium
WAOL	Western Australian Organism List
WC Act	*Wildlife Conservation Act 1950* (Western Australia)
WoNS	Weed of National Significance

11 References

Beard, J. S. (1975) The Vegetation Survey of Western Australia. *Vegetatio* 30(3): 179-187.

Beard, J. S. (1976) *Map and Explanatory Notes to Sheet 6: The Vegetation of the Murchison Region.* University of Western Australia Press, Nedlands, Western Australia.

Beard, J. S. (1990) *Plant Life of Western Australia.* Kangaroo Press, Kenthurst, New South Wales.

BoM, Bureau of Meteorology (2016) *Climate Data Online (custom search)*. Commonwealth of Australia. Available online at www.bom.gov.au./climate/data/index.shtml.

BoM, Bureau of Meteorology (2017) *Climate Data Online (custom search)*. Commonwealth of Australia. Available online at www.bom.gov.au./climate/data/index.shtml.

Chinnock, R. J. (1983) The Australian genus *Gunniopsis* Pax (Aizoaceae). *Journal of the Adelaide Botanic Gardens* 6(2): pg. 133-179.

Coffey Environments. (2013a) *Flora, Vegetation and Fauna Assessment - Mt Eelya Survey Areas*, Unpublished report prepared for Silver Lake Resources Pty Ltd.

Coffey Environments. (2013b) *Level 2 Flora and Vegetation Survey and Impact Assessment - Moyagee Tenement*, Unpublished report prepared for Silver Lake Resources Pty Ltd.

Curry, P. J., Payne, A. L., Leighton, K. A., Hennig, P. and Blood, D. A. (1994) *An inventory and condition survey of the Murchison River catchment, Western Australia.* Department of Agriculture Western Australia, Perth, W.A.

DAFWA, Department of Agriculture and Food Western Australia (2016) *Western Australian Organism List (Custom Search)*. Department of Agriculture and Food Western Australia. Available online at https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol.

Desmond, A., Cowan, M. and Chant, A. (2001) Murchison 2 (MUR2 - Western Murchison subregion). In: *A Biodiversity Audit of Western Australia's Biogeographical Subregions in 2002*. Department of Conservation and Land Management, Kensington, W.A., pp 480-496

DoEE, Department of the Environment and Energy (2016) *Protected Matters Search Tool (custom search)*. Commonwealth of Australia. Available online at http://www.environment.gov.au/epbc/protected-matters-search-tool.

DoEE, Department of the Environment and Energy,. (2017) *Weeds of National Significance.* Department of the Environment. Available online at https://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html. Accessed on 17 January 2017.

DPaW, Department of Parks and Wildlife. (2013) *Weed Prioritisation Process for DPaW (formerly DEC) – "An integrated approach to Weed Management on DPaW-managed lands in WA".*

DPaW, Department of Parks and Wildlife. (2016a) *How does Parks and Wildlife manage weeds? Species-led ranking summary results by region.* Available online at http://www.dpaw.wa.gov.au/plants-and-animals/plants/weeds/156-how-does-dpaw-manage-weeds. Accessed on.

DPaW, Department of Parks and Wildlife (2016b) *NatureMap: Mapping Western Australia's Biodiversity (custom search)*. Available online at http://naturemap.dec.wa.gov.au./default.aspx.

DPaW, Department of Parks and Wildlife (2016c) *Threatened and Priority Ecological Communities Database (custom search)*. Available online at http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities.

DPaW, Department of Parks and Wildlife (2016d) *Threatened and Priority Flora Database (custom search)*. Available online at http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants.

EPA, Environmental Protection Authority. (2000) *Environmental Protection of Native Vegetation in Western Australia*, Position Statement No. 2, Perth, Western Australia.

EPA, Environmental Protection Authority. (2002) *Terrestrial Biological Surveys as an Element of Biodiversity Protection*, Position Statement No 3., Perth, Western Australia.

EPA, Environmental Protection Authority. (2004) *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* Environmental Protection Authority, Guidance Statement No. 51, Perth, Western Australia.

EPA, Environmental Protection Authority (2006) *Rehabilitation of Terrestrial Ecosystems*. Available online at.

EPA, Environmental Protection Authority. (2016) *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* Environmental Protection Authority, Western Australia.

EPA, Environmental Protection Authority and DPaW, Department of Parks and Wildlife. (2015) *Technical Guide - Flora and Vegetation Surveys for Environmental Impact Assessment.* Perth, Western Australia.

EPA, E. P. A. (2015) *Environmental Assessment Guideline for Environmental principles, factors and objectives; EAG 8* Environmental Protection Authority, Western Australia.

ESCAVI, Executive Steering Committee for Australian Vegetation Information. (2003) *Australian Vegetation Attribute Manual: National Vegetation Information System Version 6.0* Department of Environment and Conservation, Report prepared by the Department of Environment Executive Steering Committee for Australian Vegetation Information, Canberra, Australian Capital Territory.

Geoscience Australia (2015) *Geology of Western Australia dataset*. Available online at http://www.ga.gov.au/.

Government of Western Australia. (2015) *2015 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of June 2015* https://www2.landgate.wa.gov.au/web/guest/downloader, Perth, WA.

Maslin, B. R. and Reid, J. E. (2012) A taxonomic revision of Mulga (*Acacia aneura* and its close relatives: Fabaceae) in Western Australia. *Nuytsia* 22(4): pg. 129-267.

Mattiske Consulting. (2011) *Flora and Vegetation of the Andy Well Survey Area*, Unpublished report Prepared for Doray Minerals Pty Ltd.

McKenzie, N. L., May, J. E. and McKenna, S. (2003) *Bioregional Summary of the 2002 Biodiversity Audit for Western Australia: A Contribution to the Development of Western Australia's Biodiversity Conservation Strategy.* Department of Conservation and Land Management, Kensington, Western Australia.

MWH, Australia. (2015a) *CMGP Reedy Project Dewatering Program - Level 1 Flora and Fauna Survey*.

MWH, Australia. (2015b) *Lake Annean Flora and Fauna Assessment*, Unpublished report prepared for Metals X Limited.

MWH, Australia. (2016a) *Culculli and Paddy Italiano Level 1 Flora, Vegetation and Fauna Assessment*, Unpublished report prepared for Metals X Limited.

MWH, Australia. (2016b) *Gibraltar and Five Mile Well Project Areas: Level 1 Flora and Fauna Assessment*, Unpublished report prepared for Metals X Limited.

Northcote, K. H., Beckmann, G. G., Bettenay, E., Churchward, H. M., Van Dijk, D. C., Dimmock, G. M., Hubble, G. D., Isbell, R. F., McArthur, W. M., Murtha, G. G., Nicolls, K. D., Paton, T. R., Thompson, C. H., Webb, A. A. and Wright, M. J. (1960-1968) *Atlas of Australian Soils, Sheets 1 to 10* CSIRO Australia, Melbourne, Victoria.

Rye, B. L. (1995) New and priority taxa in the genera *Cryptandra* and *Stenanthemum* (Rhamnaceae) of Western Australia. *Nuytsia* 10(2): pg. 255-305.

Shepherd, D. P., Beeston, G. R. and Hopkins, A. J. M. (2002) *Native Vegetation in Western Australia. Extent, Type and Status*, Department of Agriculture, Western Australia.

Thackway, R. and Cresswell, I. D. (1995) *An Interim Biogeographical Regionalisation for Australia.* Australian Nature Conservation Agency, Canberra, Australian Capital Territory.

Thompson, G. G. and Withers, P. C. (2003) Effect of species richness and relative abundance on the shape of the species accumulation curve. *Austral Ecology* 28: 355-360.

Thompson, G. G., Withers, P. C., Pianka, E. R. and Thompson, S. A. (2003) Assessing biodiversity with species accumulation curves; inventories of small reptiles by pit-trapping in Western Australia. *Austral Ecology* 28: 361-383.

Trudgen, M. E. (1988) *A report on the flora and vegetation of the Port Kennedy area*, Unpublished report prepared for Bowman Bishaw and Associates, West Perth.

WAH, Western Australian Herbarium (2016) *FloraBase: the Western Australian Flora*. Department of Parks and Wildlife. Available online at https://florabase.dpaw.wa.gov.au/.

WAH, Western Australian Herbarium (2017) *FloraBase: the Western Australian Flora*. Department of Parks and Wildlife. Available online at https://florabase.dpaw.wa.gov.au/.

Appendices

Appendix A Levels of flora and vegetation survey

Adapted from **Technical Guide - Flora and Vegetation Surveys for Environmental Impact Assessment** (EPA and DPaW 2015) and **Guidance for the Assessment of Environmental Factors No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia** (EPA 2004)

There are two levels of flora and vegetation assessment. The appropriate level of survey is based on the scale and nature of potential impacts set against the contextual information acquired in a desktop study on the values of the flora and vegetation, in conjunction with EPA Guidance. The decision on extent and level of flora and vegetation survey must ensure sufficient information is available to assess potential impacts. Survey levels differ in the capacity of the survey work to provide detail of the conservation and functional values of the target area and its immediate context.

Level	Purpose	Components
1	Required where flora and vegetation values are well defined, the area is not likely to support conservation significant species or communities and the scale and nature of potential impacts are not likely to be significant. In many cases, the Level 1 survey may indicate that more detailed information will be required to determine potential impacts to the flora and vegetation in the region, initiating a Level 2 survey.	**Desktop Study** to gather background information on the target area via a search of all sources of literature, data and map-based information. **Reconnaissance Survey** to verify the accuracy of the background study and further delineate and characterise the flora and the range of vegetation units present in the target area, and to identify potential impacts. This involves a target area visit by suitably qualified personnel to undertake selective, low intensity sampling of the flora and vegetation, and to produce maps of vegetation units and vegetation condition at an appropriate scale.
2	Required if the area supports a high diversity of flora or vegetation, restricted landforms or vegetation units, conservation significant species or communities (or their habitat), the scale and nature of the potential impacts are likely to be significant, or if the related proposal is in a region that has been subject to minimal survey effort.	**Desktop Study** (described above) **Reconnaissance Survey** (as required, described above) **Detailed Survey** which includes multiple quadrats located at representative points throughout each preliminary vegetation type. To clarify vegetation unit boundaries, additional quadrats can be deployed or quadrats rescored during supplementary surveys. Traverses or transects may also be used to provide supplementary information. **Targeted Survey** (as required – may form a separate survey) to determine the size and extent of all conservation significant flora populations or ecological community occurrences in the survey area and to place any impacts into context.

Appendix B Codes and terms used to describe conservation significance

Flora and fauna may be accorded legislative protection by being listed under the Environment Protection and Biodiversity Conservation Act 1999 (Cwlth) (EPBC Act) and/or the Wildlife Conservation Act 1950 (WA) (WC Act), or by being listed on the WA Department of Environment and Conservation's Priority Species List. This Appendix presents a summary of the different rankings and listings used to describe conservation status. Some categories, such as 'extinct', 'extinct in the wild' and 'conservation dependent' (EPBC Act) are not presented here, as the table includes only the information needed to fully understand the codes presented in the preceding report. Refer to the relevant legislation for a full description of all codes in use, as well as their associated criteria.

Definitions of codes and terms used to describe flora and fauna of conservation significance

Status	Code	Description
Categories used under the EPBC Act		
Critically Endangered	Cr	Taxa that is considered to be facing an extremely high risk of extinction in the wild in the immediate future
Endangered	En	Taxa that is considered to be facing a very high risk of extinction in the wild in the near future
Vulnerable	Vu	Taxa that is considered to be facing a high risk of extinction in the wild in the medium-term future
Migratory	Mi	Fauna that migrate to, over and within Australia and its external territories.
Schedules used under the WC Act		
Critically Endangered	Schedule 1	Taxa that is rare or likely to become extinct, as critically endangered fauna
Endangered	Schedule 2	Taxa that is rare or likely to become extinct, as endangered fauna
Vulnerable	Schedule 3	Taxa that is rare or likely to become extinct, as vulnerable fauna
Presumed Extinct	Schedule 4	Taxa that is presumed to be extinct
Migratory	Schedule 5	Birds that are subject to international agreements relating to the protection of migratory birds
DPaW Priority flora and fauna lists		
Priority 1	P1	Taxa with few, poorly known populations on threatened lands. These are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority 2	P2	Taxa with few, poorly known populations on conservation lands. These are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Status	Code	Description
Priority 3	P3	Taxa with several, poorly known populations, some on conservation lands. These are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority 4	P4	Taxa in need of monitoring. These are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
Priority 5	P5	Taxa in need of monitoring. These are not considered threatened but are subject to a specific conservation programme, the cessation of which would result in the species becoming threatened within five years.

Appendix C Parks and Wildlife NatureMap database search results

NatureMap
Mapping Western Australia's biodiversity

Flora_NatureMap_List

Created By Clinton Van Den Bergh on 07/10/2016

Current Names Only	Yes
Core Datasets Only	Yes
Data Source	Threatened and Priority Flora Database or WA Herbarium Specimen Database
Method	'By Circle'
Centre	118° 47' 00" E,26° 19' 51" S
Buffer	40km
Group By	Family

Family	Species	Records
Acanthaceae	2	3
Acarosporaceae	1	1
Aizoaceae	2	4
Amaranthaceae	17	30
Apocynaceae	1	1
Asparagaceae	1	5
Asteraceae	33	57
Boraginaceae	3	4
Brassicaceae	6	7
Campanulaceae	1	1
Chenopodiaceae	20	26
Cleomaceae	1	1
Colchicaceae	1	1
Convolvulaceae	4	5
Crassulaceae	1	1
Cupressaceae	1	2
Cyperaceae	5	5
Euphorbiaceae	1	1
Fabaceae	56	147
Fossombroniaceae	1	1
Geraniaceae	2	7
Goodeniaceae	12	19
Gyrostemonaceae	1	1
Haloragaceae	1	1
Juncaginaceae	1	2
Lamiaceae	6	16
Loranthaceae	4	6
Malvaceae	5	12
Myrtaceae	19	54
Ophioglossaceae	1	1
Phrymaceae	1	1
Phyllanthaceae	1	1
Pittosporaceae	1	2
Poaceae	18	23
Portulacaceae	11	12
Proteaceae	6	13
Pteridaceae	1	1
Rhamnaceae	1	1
Ricciaceae	3	4
Rubiaceae	3	7
Rutaceae	1	1
Santalaceae	2	2
Sapindaceae	3	4
Scrophulariaceae	41	131
Solanaceae	7	11
Stylidiaceae	1	3
Thymelaeaceae	1	1
Urticaceae	1	1
TOTAL	**313**	**641**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthaceae					
1.	7164	*Dicladanthera forrestii*			
2.	17325	*Harnieria kempeana subsp. muelleri*			
Acarosporaceae					
3.	46014	*Myriospora smaragdula*			
Aizoaceae					
4.	2819	*Tetragonia cristata*			
5.	44241	*Trianthema glossostigmum*			
Amaranthaceae					
6.	2646	*Aerva javanica (Kapok Bush)*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
7.	2656	*Amaranthus caudatus (Love Lies Bleeding)*	Y		
8.	2690	*Ptilotus aervoides*			
9.	2691	*Ptilotus albidus*			
10.	2708	*Ptilotus chamaecladus*			
11.	2717	*Ptilotus divaricatus (Climbing Mulla Mulla)*			
12.	41506	*Ptilotus gaudichaudii subsp. gaudichaudii*			
13.	2729	*Ptilotus grandiflorus*			
14.	2731	*Ptilotus helipteroides (Hairy Mulla Mulla)*			
15.	2741	*Ptilotus macrocephalus (Featherheads)*			
16.	2746	*Ptilotus nobilis (Tall Mulla Mulla)*			
17.	2747	*Ptilotus obovatus (Cotton Bush)*			
18.	11396	*Ptilotus obovatus var. obovatus*			
19.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
20.	2754	*Ptilotus roei*			
21.	2755	*Ptilotus rotundifolius (Royal Mulla Mulla)*			
22.	11219	*Ptilotus schwartzii var. georgei*			
Apocynaceae					
23.	6584	*Cynanchum floribundum (Dumara Bush, Tjipa)*			
Asparagaceae					
24.	1338	*Thysanotus manglesianus (Fringed Lily)*			
Asteraceae					
25.	7871	*Brachyscome ciliaris*			
26.	7906	*Calotis plumulifera*			
27.	7921	*Centipeda thespidioides (Desert Sneezewood)*			
28.	13138	*Chrysocephalum puteale*			
29.	7933	*Chthonocephalus pseudevax (Woolly Groundheads)*			
30.	12619	*Chthonocephalus viscosus*			
31.	7943	*Cotula australis (Common Cotula)*			
32.	12718	*Erymophyllum compactum*			
33.	12739	*Erymophyllum ramosum*			
34.	14377	*Erymophyllum ramosum subsp. ramosum*			
35.	29594	*Helichrysum luteoalbum (Jersey Cudweed)*			
36.	8045	*Helipterum craspedioides (Yellow Billy Buttons)*			
37.	15448	*Hyalosperma glutinosum subsp. venustum*			
38.	8096	*Lactuca serriola (Prickly Lettuce)*	Y		
39.	29046	*Lactuca serriola forma serriola*	Y		
40.	13289	*Lawrencella davenportii*			
41.	12628	*Lemooria burkittii*			
42.	8116	*Myriocephalus guerinae*			
43.	8121	*Myriocephalus rudallii*			
44.	8151	*Olearia stuartii*			
45.	45238	*Podolepis aristata subsp. affinis*			
46.	8173	*Podolepis capillaris (Wiry Podolepis)*			
47.	8176	*Podolepis kendallii*			
48.	13306	*Rhodanthe battii*			
49.	13242	*Rhodanthe chlorocephala subsp. splendida*			
50.	13303	*Rhodanthe sterilescens*			
51.	45154	*Roebuckiella cheilocarpa var. cheilocarpa*			
52.	45148	*Roebuckiella ciliocarpa*			
53.	45146	*Roebuckiella oncocarpa*			
54.	45178	*Roebuckiella similis*			
55.	8200	*Schoenia cassiniana (Schoenia)*			
56.	8236	*Streptoglossa cylindriceps*			
57.	13331	*Waitzia acuminata var. acuminata*			
Boraginaceae					
58.	6690	*Halgania gustafsenii*			
59.	17493	*Halgania gustafsenii var. gustafsenii*			
60.	6712	*Heliotropium heteranthum*			
Brassicaceae					
61.	3051	*Menkea draboides*		P3	
62.	3053	*Menkea sphaerocarpa*			
63.	3054	*Menkea villosula*			
64.	3069	*Sisymbrium erysimoides (Smooth Mustard)*	Y		
65.	3072	*Sisymbrium orientale (Indian Hedge Mustard)*	Y		
66.	3078	*Stenopetalum nutans*			
Campanulaceae					
67.	36881	*Lobelia simulans*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Chenopodiaceae					
68.	2481	*Atriplex vesicaria (Bladder Saltbush)*			
69.	2494	*Chenopodium murale (Nettle-leaf Goosefoot)*	Y		
70.	2499	*Dissocarpus paradoxus (Curious Saltbush)*			
71.	11632	*Dysphania glomulifera subsp. eremaea*			
72.	2506	*Dysphania rhadinostachya*			
73.	33483	*Dysphania saxatilis*			
74.	2538	*Maireana carnosa (Cottony Bluebush)*			
75.	2539	*Maireana convexa (Mulga Bluebush)*			
76.	2544	*Maireana georgei (Satiny Bluebush)*			
77.	2551	*Maireana melanocoma (Pussy Bluebush)*			
78.	2556	*Maireana planifolia (Low Bluebush)*			
79.		*Maireana sp.*			
80.	2566	*Maireana thesioides (Lax Bluebush)*			
81.	2571	*Maireana villosa*			
82.	30434	*Salsola australis*			
83.	2603	*Sclerolaena cornishiana (Cartwheel Burr)*			
84.	2611	*Sclerolaena eriacantha (Tall Bindii)*			
85.	8877	*Sclerolaena gardneri*			
86.	31492	*Tecticornia disarticulata*			
87.	31851	*Tecticornia sp. Yoothapina Station (A.A. Mitchell 883)*			
Cleomaceae					
88.	2985	*Cleome oxalidea*			
Colchicaceae					
89.	31335	*Wurmbea sp. Denham Pool (F. Hort et al. 2216)*		P1	Y
Convolvulaceae					
90.	6612	*Convolvulus clementii*			
91.	6663	*Cuscuta epithymum (Lesser Dodder, Greater Dodder)*	Y		
92.	11021	*Cuscuta planiflora*	Y		
93.	6621	*Ipomoea calobra (Weir Vine)*			
Crassulaceae					
94.	19376	*Bryophyllum delagoense*	Y		
Cupressaceae					
95.	8466	*Callitris columellaris (White Cypress Pine)*			
Cyperaceae					
96.	750	*Bulbostylis barbata*			
97.	12799	*Cyperus betchei subsp. commiscens*			
98.	782	*Cyperus concinnus*			
99.	798	*Cyperus iria*			
100.	814	*Cyperus squarrosus*			
Euphorbiaceae					
101.	4620	*Euphorbia boophthona (Gascoyne Spurge)*			
Fabaceae					
102.	3217	*Acacia aneura (Mulga, Wanari)*			
103.	37260	*Acacia aptaneura*			
104.	3232	*Acacia ayersiana*			
105.	3248	*Acacia burkittii (Sandhill Wattle)*			
106.	36417	*Acacia caesaneura*			
107.	3273	*Acacia craspedocarpa (Hop Mulga)*			
108.	3280	*Acacia cuspidifolia (Bohemia)*			
109.	15279	*Acacia cuthbertsonii subsp. linearis*			
110.	32118	*Acacia effusifolia*			
111.	3330	*Acacia exocarpoides*			
112.	36781	*Acacia fuscaneura*			
113.	36418	*Acacia incurvaneura*			
114.	3392	*Acacia jamesiana*			
115.	3399	*Acacia kempeana (Witchetty Bush, Ilykuwara)*			
116.	3443	*Acacia microcalyx*			
117.	36416	*Acacia mulganeura*			
118.	15724	*Acacia paraneura*			
119.	3500	*Acacia pruinocarpa (Gidgee)*			
120.	36800	*Acacia pteraneura*			
121.	29015	*Acacia pyrifolia var. pyrifolia*			
122.	3507	*Acacia quadrimarginea*			
123.	19483	*Acacia ramulosa var. linophylla*			
124.	19499	*Acacia ramulosa var. ramulosa*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
125.	3519	*Acacia rhodophloia*			
126.	29114	*Acacia sp. Nalgi (N.T. Burbidge 1317)*			
127.	18610	*Acacia sp. Wiluna (B.R. Maslin 7090)*			
128.	3577	*Acacia tetragonophylla (Kurara, Wakalpuka)*			
129.	29531	*Acacia thoma*			
130.	31511	*Acacia victoriae subsp. victoriae*			
131.	3598	*Acacia wanyu*			
132.	15295	*Acacia xanthocarpa*			
133.	3938	*Glycine canescens (Silky Glycine)*			
134.		*Glycine sp.*			
135.	19547	*Indigofera chamaeclada*			
136.	3974	*Indigofera georgei (Bovine Indigo)*			
137.	3982	*Indigofera monophylla*			
138.	3989	*Isotropis atropurpurea (Poison Sage)*			
139.	3994	*Isotropis forrestii*			
140.	4055	*Leptosema chambersii*			
141.	3613	*Leucaena leucocephala (Leucaena)*	Y		
142.	4098	*Mirbelia rhagodioides*			
143.	13229	*Phyllota humilis*			
144.	17645	*Senna artemisioides*			
145.	12279	*Senna artemisioides subsp. helmsii*			
146.	12283	*Senna artemisioides subsp. x sturtii*			
147.	18444	*Senna charlesiana*			
148.	12305	*Senna glutinosa subsp. chatelainiana*			
149.	12308	*Senna glutinosa subsp. x luerssenii*			
150.	12314	*Senna pleurocarpa var. pleurocarpa*			
151.	14579	*Senna sp. Austin (A. Strid 20210)*			
152.	14577	*Senna sp. Meekatharra (E. Bailey 1-26)*			
153.	18445	*Senna stricta*			
154.	13595	*Swainsona elegantoides*			
155.	12356	*Swainsona formosa*			
156.	4233	*Swainsona leeana*			
157.	4239	*Swainsona pedunculata*			
Fossombroniaceae					
158.		*Fossombronia sp.*			
Geraniaceae					
159.	4334	*Erodium crinitum (Corkscrew)*			
160.	4335	*Erodium cygnorum (Blue Heronsbill)*			
Goodeniaceae					
161.	7413	*Brunonia australis (Native Cornflower)*			
162.	7495	*Goodenia berardiana*			
163.	12512	*Goodenia berringbinensis*		P4	
164.	7514	*Goodenia havilandii*			
165.	12530	*Goodenia macroplectra*			
166.	7527	*Goodenia mimuloides*			
167.	7556	*Goodenia tenuiloba*			
168.	7564	*Goodenia wilunensis*			
169.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
170.	7658	*Velleia discophora (Cabbage Poison)*			
171.	7660	*Velleia glabrata (Pee the Bed)*			
172.		*Velleia sp.*			
Gyrostemonaceae					
173.	2778	*Codonocarpus cotinifolius (Native Poplar, Kundurangu)*			
Haloragaceae					
174.	16371	*Haloragis odontocarpa forma pterocarpa*			
Juncaginaceae					
175.	33276	*Triglochin isingiana*			
Lamiaceae					
176.	31840	*Dicrastylis mitchellii*		P1	
177.	6774	*Dicrastylis sessilifolia*			
178.	33779	*Hemigenia tomentosa*			
179.	6912	*Prostanthera campbellii*			
180.	6926	*Prostanthera wilkieana*			
181.	6827	*Spartothamnella teucriiflora*			
Loranthaceae					
182.	2372	*Amyema fitzgeraldii (Pincushion Mistletoe)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
183.	11614	*Amyema gibberula var. gibberula*			
184.	2382	*Amyema nestor*			
185.	2398	*Lysiana murrayi (Mistletoe, Parka-Parka)*			
Malvaceae					
186.	4924	*Hibiscus burtonii*			
187.	4942	*Hibiscus sturtii (Sturt's Hibiscus)*			
188.	19636	*Keraudrenia velutina subsp. elliptica*			
189.	31759	*Sida ectogama*			
190.	31854	*Sida sp. Excedentifolia (J.L. Egan 1925)*			
Myrtaceae					
191.	19470	*Aluta maisonneuvei subsp. auriculata*			
192.	19469	*Aluta maisonneuvei subsp. maisonneuvei*			
193.	5438	*Calytrix amethystina*			
194.	5451	*Calytrix desolata*			
195.	12373	*Calytrix uncinata*			
196.	5486	*Calytrix verruculosa*		P3	
197.	16780	*Corymbia candida subsp. dipsodes*			
198.	17077	*Corymbia ferriticola*			
199.	5583	*Eucalyptus carnei (Carne's Blackbutt)*			
200.	20300	*Eucalyptus eremicola subsp. peeneri*			
201.	13528	*Eucalyptus kingsmillii subsp. kingsmillii*			
202.	13057	*Eucalyptus leptopoda subsp. arctata*			
203.	13058	*Eucalyptus leptopoda subsp. elevata*			
204.	5703	*Eucalyptus lucasii (Barlee Box)*			
205.	29733	*Eucalyptus trivalva (Victoria Spring Mallee)*			
206.	14548	*Eucalyptus victrix*			
207.	5814	*Homalocalyx staminosus*			
208.	6003	*Micromyrtus sulphurea*			
209.	6054	*Thryptomene decussata*			
Ophioglossaceae					
210.	17	*Ophioglossum lusitanicum (Adders Tongue)*			
Phrymaceae					
211.	12486	*Peplidium aithocheilum*			
Phyllanthaceae					
212.	17626	*Phyllanthus erwinii*			
Pittosporaceae					
213.	19744	*Pittosporum angustifolium*			
Poaceae					
214.	207	*Aristida contorta (Bunched Kerosene Grass)*			
215.	12063	*Aristida holathera var. holathera*			
216.	212	*Aristida inaequiglumis (Feathertop Threeawn)*			
217.	17251	*Austrostipa scabra*			
218.	242	*Brachyachne prostrata*			
219.	279	*Cymbopogon ambiguus (Scentgrass)*			
220.	365	*Enneapogon polyphyllus (Leafy Nineawn)*			
221.	378	*Eragrostis dielsii (Mallee Lovegrass)*			
222.	380	*Eragrostis eriopoda (Woollybutt Grass, Wangurnu)*			
223.	385	*Eragrostis lacunaria (Purple Lovegrass)*			
224.	392	*Eragrostis pergracilis*			
225.	398	*Eragrostis tenellula (Delicate Lovegrass)*			
226.	408	*Eriachne flaccida (Claypan Grass)*			
227.	490	*Monachather paradoxus*			
228.	494	*Neurachne minor*			
229.	11151	*Rostraria pumila*	Y		
230.	613	*Setaria verticillata (Whorled Pigeon Grass)*	Y		
231.	17877	*Triodia melvillei*			
Portulacaceae					
232.	2845	*Calandrinia brevipedata (Short-stalked Purslane)*			
233.	2853	*Calandrinia eremaea (Twining Purslane)*			
234.	2859	*Calandrinia papillata*			
235.	2860	*Calandrinia polyandra (Parakeelya)*			
236.	2864	*Calandrinia ptychosperma*			
237.	2865	*Calandrinia pumila*			
238.	2868	*Calandrinia reticulata*			
239.	2869	*Calandrinia schistorhiza*			
240.	2870	*Calandrinia stagnensis*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
241.	2879	*Portulaca cyclophylla*			
242.	2884	*Portulaca oleracea (Purslane, Wakati)*			
Proteaceae					
243.	1986	*Grevillea deflexa*			
244.	2019	*Grevillea inconspicua (Cue Grevillea)*		P4	
245.	2163	*Hakea francisiana (Emu Tree)*			
246.	19137	*Hakea lorea subsp. lorea*			
247.	17556	*Hakea recurva subsp. arida*			
248.	17557	*Hakea recurva subsp. recurva*			
Pteridaceae					
249.	37	*Cheilanthes lasiophylla (Woolly Cloak Fern)*			
Rhamnaceae					
250.	16199	*Stenanthemum petraeum*			
Ricciaceae					
251.		*Riccia cavernosa*			
252.		*Riccia crystallina*			
253.		*Riccia nigrella*			
Rubiaceae					
254.	18206	*Psydrax attenuata*			
255.	18154	*Psydrax latifolia*			
256.	18210	*Psydrax rigidula*			
Rutaceae					
257.	4460	*Drummondita miniata*		P3	
Santalaceae					
258.	2357	*Santalum lanceolatum (Northern Sandalwood, Yarnguli)*			
259.	2359	*Santalum spicatum (Sandalwood, Wilarak)*			
Sapindaceae					
260.	4772	*Dodonaea pachyneura*			
261.	4773	*Dodonaea petiolaris*			
262.	4782	*Dodonaea viscosa (Sticky Hopbush)*			
Scrophulariaceae					
263.	7189	*Eremophila clarkei (Turpentine Bush)*			
264.	17157	*Eremophila compacta subsp. compacta*			
265.	17155	*Eremophila compacta subsp. fecunda*			
266.	12951	*Eremophila enata*			
267.	7204	*Eremophila eriocalyx (Desert Pride)*			
268.	7205	*Eremophila exilifolia*			
269.	7206	*Eremophila falcata*			
270.	16792	*Eremophila flabellata*			
271.	7207	*Eremophila foliosissima*			
272.	7208	*Eremophila forrestii (Wilcox Bush)*			
273.	15052	*Eremophila forrestii subsp. forrestii*			
274.	17152	*Eremophila forrestii subsp. hastieana (Grey Poverty Bush)*			
275.	16696	*Eremophila fraseri subsp. fraseri*			
276.	29532	*Eremophila galeata*			
277.	7214	*Eremophila gilesii (Charleville Turkey Bush)*			
278.	17176	*Eremophila gilesii subsp. variabilis*			
279.	7216	*Eremophila glutinosa*			
280.	17172	*Eremophila hughesii subsp. hughesii*			
281.	7228	*Eremophila lachnocalyx (Woolly-calyxed Eremophila)*			
282.	7230	*Eremophila latrobei (Warty Fuchsia Bush, Mintjingka)*			
283.	17169	*Eremophila latrobei subsp. glabra*			
284.	17576	*Eremophila latrobei subsp. latrobei*			
285.	7233	*Eremophila linearis (Harlequin Fuchsia Bush)*			
286.	7234	*Eremophila longifolia (Berrigan, Tulypurpa)*			
287.	7236	*Eremophila macmillaniana (Grey Turpentine Bush)*			
288.	16363	*Eremophila maculata subsp. brevifolia (Native Fuchsia)*			
289.	7239	*Eremophila margarethae (Sandbank Poverty Bush)*			
290.	18211	*Eremophila micrantha*			
291.	18570	*Eremophila oppositifolia subsp. angustifolia*			
292.	15173	*Eremophila pendulina*			
293.	17167	*Eremophila phyllopoda subsp. phyllopoda*			
294.	15058	*Eremophila platycalyx subsp. platycalyx*			
295.	7256	*Eremophila punctata*			
296.	17166	*Eremophila simulans subsp. lapidensis*			
297.		*Eremophila sp.*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
298.	7270	*Eremophila spathulata (Spoon-leaved Eremophila)*			
299.	17163	*Eremophila spectabilis subsp. brevis*			
300.	17190	*Eremophila spectabilis subsp. spectabilis*			
301.	15168	*Eremophila spuria*			
302.	7273	*Eremophila strongylophylla*			
303.	15155	*Eremophila youngii subsp. youngii*			
Solanaceae					
304.	6966	*Duboisia hopwoodii (Pituri, Kundugu)*			
305.	6972	*Nicotiana cavicola (Talara)*			
306.	42547	*Solanum austropiceum*			
307.	7016	*Solanum lachnophyllum*			
308.	7022	*Solanum nigrum (Black Berry Nightshade)*	Y		
309.	7026	*Solanum orbiculatum (Wild Tomato)*			
310.	11241	*Solanum orbiculatum subsp. orbiculatum (Round-leaved Solanum)*			
Stylidiaceae					
311.	7754	*Stylidium longibracteatum (Long-bracted Trigger Plant)*			
Thymelaeaceae					
312.	5256	*Pimelea microcephala (Shrubby Riceflower, Banjine)*			
Urticaceae					
313.	12670	*Parietaria cardiostegia*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix D EPBC Protected Matters database search results

Australian Government
Department of the Environment and Energy

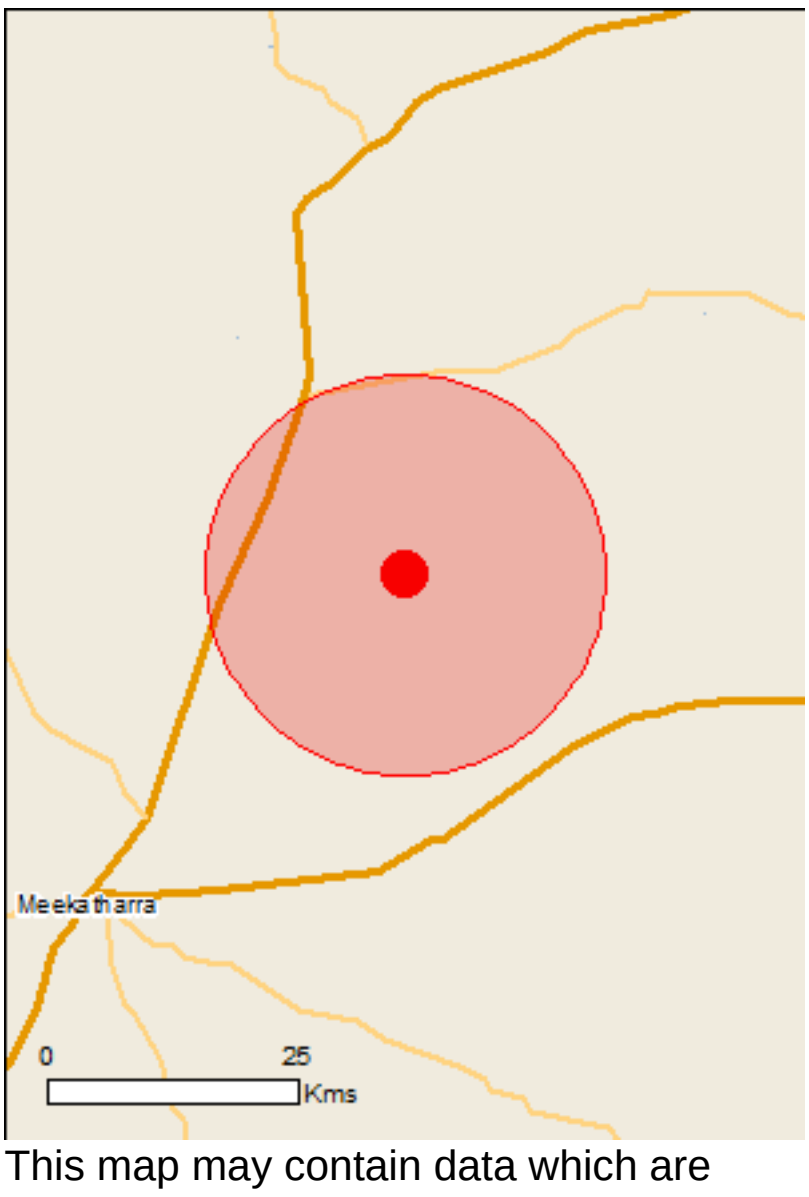
EPBC Act Protected Matters Report

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.

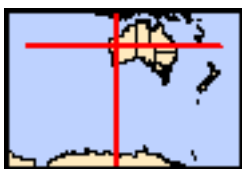
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/10/16 13:34:14



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 20.0Km



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.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	5
Listed Migratory Species:	4

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. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

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.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	6
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	9
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae		
Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Plants		
Pityrodia augustensis		
Mt Augustus Foxglove [4962]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area

Extra Information

Invasive Species	[Resource Information]

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

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Equus asinus Donkey, Ass [4]		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		
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

Caveat

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

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

-26.33083 118.78306

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:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian 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
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

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

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix E Threatened and Priority Flora Likelihood

Species	Conservation Code			Habit, Flowering Period and Habitat[1]	Source[2]	Likelihood of Occurrence and Reason
	EPBC Act	WC Act	DPaW			
Acacia burrowsiana			3	Stout shrub or tree, to 5 m high, bark grey, fibrous, fissured, smooth on upper branches; phyllodes sub-rigid, sub-glaucous, erect, coarsely pungent. Red-brown loams with ironstone rubble on surface, calcrete soils, laterite, quartz. Flats adjacent to watercourses, crests of low rises, breakaways	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Acacia dilloniorum			1	Description unknown.	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Acacia speckii			4	Bushy, rounded shrub or tree, 1.5-3 m high. Rocky soils over granite, basalt or dolerite. Rocky hills or rises	B	**Possible** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Angianthus microcephalus			2	Decumbent or ascending annual, herb, 0.06-0.1(-0.21) m high. Fl. yellow, Sep to Dec. Sandy or clayey soils. Salt swamps & pans	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Angianthus uniflorus			1	Erect or ascending annual, herb, to 0.07 m high. Margin of calcrete rise near gypseous salt lake	B	**Unlikely** No records within 40 km of the Study Area. Only recorded from one population at the edge of Lake Austin.
Baeckea sp. London Bridge (M.E. Trudgen 5393)			3	Rounded shrub, 0.3-0.5 m high. Fl. red, Oct to Nov. Gravel, sandstone. Rocky breakaways & hills	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Baeckea sp. Sandstone (C.A. Gardner s.n. 26 Oct 1963)			3	Upright shrub, ca 1 m high. Fl. white, Oct. Orange sand. Flats	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Bergia auriculata			2	Prostrate perennial, herb. Clay soils. Mud flats	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.

Species	Conservation Code			Habit, Flowering Period and Habitat[1]	Source[2]	Likelihood of Occurrence and Reason
	EPBC Act	WC Act	DPaW			
Beyeria lapidicola			1	Description unknown.	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Bossiaea eremaea			3	Divaricately-branched, spreading shrub, to 1.2 m high. Fl. red-yellow-purple-brown, Jul to Sep. Deep red sand	B	**Unlikely** The Study Area is outside the distribution of this taxon, there are no records within 40 km of the Study Area, and none of this taxon's typical habitat occurs within the Study Area.
Calotis sp. Perrinvale Station (R.J. Cranfield 7096)			3	Annual, to 0.05 m	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Calytrix verruculosa			3	Shrub, 0.4-0.75 m high. Fl. pink/white, Aug or Oct. Sandy clay	A, B, C, E	**Likely** There are records 24 km south west of the Study Area and the Study are contains suitable habitat.
Dampiera plumosa			1	Erect perennial, herb, 0.15-0.2 m high. Fl. blue, Oct. Red sandy soils	B	**Unlikely** The Study Area is outside the distribution of this taxon, there are no records within 40 km of the Study Area, and none of this taxon's typical habitat occurs within the Study Area.
Dicrastylis mitchellii			1	Shrub, to about 0.3 m high. Sand or clay soils. Around dunes	B, C	**Unlikely** There are records 15 km east of the proposed Study Are, however none of this taxon's typical habitat occurs within the Study Area.
Dodonaea amplisemina			4	Dioecious, multi-stemmed shrub, 0.3-1 m high. Red-brown sandy clay on basalt and gabbro and banded ironstone or on dolerite and quartzite. Rocky hills	B	**Possible** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Drummondita miniata			3	Divaricately branched shrub, 0.5-2 m high. Fl. orange-red, Jul to Aug or Nov. Laterite. Breakaways	B, C	**Likely** There are records 20 km south east of the Study area and the Study Area contains suitable habitat.
Eremophila arachnoides subsp. *arachnoides*			3	Broom-like shrub, to 3 m high, branches with circular, discrete tubercles. Fl. white/blue-purple, Sep. Shallow loam over limestone	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.

Species	Conservation Code			Habit, Flowering Period and Habitat[1]	Source[2]	Likelihood of Occurrence and Reason
	EPBC Act	WC Act	DPaW			
Eremophila arguta			1	Shrub	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Eremophila congesta			1	Upright shrub, to 1.2 m high. Fl. purple-blue, Aug to Sep. Lateritic outcrops in greenstone hills, stony quartzite slopes	B	**Unlikely** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Eremophila fasciata			3	Erect shrub, 0.6-0.9 m high. Fl. blue-violet, Aug	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Eremophila flaccida subsp. *attenuata*			3	Erect, compact shrub, ca 0.5 m high. Fl. pink & blue, May. Stony clay over quartzite. Hillslopes, ridges	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Eremophila pungens			4	Erect, viscid shrub, 0.5-1.5 m high. Fl. purple-violet, Jun to Aug. Sandy loam, clayey sand over laterite. Plains, ridges, breakaways	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Eremophila retropila			1	Spreading shrub, 0.7-1.7 m high, to 4.2 m wide. Fl. purple-red-white, Aug to Sep. Gravelly loam. Stony flats	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Eremophila rhegos			1	Erect shrub, ca 1 m high. Fl. blue-purple-white, Sep. Skeletal stony loam over granite	B	**Unlikely** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Eremophila rostrata subsp. *rostrata*	CR	CR		Rounded shrub, to 3 m high. Saline quartzite loams. Hills and flats	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Eremophila sp. Meekatharra (D.J. Edinger 4430)			1	Description unknown	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Euryomyrtus inflata			3	Shrub, 0.3-0.7 m high, leaves dull green, fruits erect. Fl. white-pink, Jun to Jul. Deep red sand. Flat plain	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.

Species	Conservation Code			Habit, Flowering Period and Habitat[1]	Source[2]	Likelihood of Occurrence and Reason
	EPBC Act	WC Act	DPaW			
Euryomyrtus recurva			3	Shrub, 0.3-1 m high. Fl. white-pink, Jul to Sep. Yellow/red sand, brown/yellow sandy clay. Gravel pits, catchment slopes	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Goodenia berringbinensis			4	Ascending annual, herb, 0.1-0.3 m high. Fl. yellow, Oct. Red sandy loam. Along watercourses	B, C	**Possible** There are records 9.5 km north west of the Study Area, however the Study Area is unlikely to contain suitable habitat.
Grevillea inconspicua			4	Intricately branched, spreading shrub, 0.6-2 m high. Fl. white/pink-white, Jun to Aug. Loam, gravel. Along drainage lines on rocky outcrops, creeklines	A, B, C, E	**Possible** There are records 30 km south west of the Study Area, which may contain suitable habitat.
Hemigenia tysonii			3	Upright shrub, to 0.5 m high. Fl. purple-blue-pink/white, May or Jul to Dec. Red sand, sandy clay, lateritic sand. Flats, sand dunes, hills	B	**Unlikely** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Hemigenia virescens			3	Description unknown	B	**Unlikely** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Hibiscus krichauffianus			3	Low or ascending shrub, (0.03-)0.2-0.7 m high. Fl. purple-pink, Mar or Oct. Red sandy soils	B	**Unlikely** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Homalocalyx echinulatus			3	Shrub, 0.45-1 m high. Fl. pink, Jun to Sep. Laterite. Breakaways, sandstone hills	B	**Possible** The Study Area is within the distribution of this taxon, however there are records 40 km away and the Study Area may contain suitable habitat.
Indigofera gilesii			3	Shrub, to 1.5 m high. Fl. purple-pink, May or Aug. Pebbly loam. Amongst boulders & outcrops, hills	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Jacksonia lanicarpa			1	Shrub, to 2 m high. Fl. orange, Nov. Red sand	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.

Species	Conservation Code			Habit, Flowering Period and Habitat[1]	Source[2]	Likelihood of Occurrence and Reason
	EPBC Act	WC Act	DPaW			
Labichea eremaea			3	Compact, rigid shrub, 0.3-0.8 m high, 0.3-1 m wide. Fl. yellow, Aug to Sep. Red sand	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Lepidium xylodes			1	Erect shrub, 0.4-1.5 m high, stems becoming spinescent. Fl. white/cream, Aug or Nov. Gravelly loam, clayey sand	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Maireana prosthecochaeta			3	Open, densely-leaved shrub, 0.3-0.6 m high. Laterite. Hills, salty places	B	**Possible** The Study Area is centred within the distribution of this taxon and may contain suitable habitat, however there no records within 40 km of the Study Area
Menkea draboides			3	Prostrate, spreading annual, herb, to 0.6 m wide. Fl. white/cream, Aug to Sep. Red sand or clay, granite	A, B, C, E	**Possible** There are records 33 km south west of the Study Area, which may contain suitable habitat.
Micromyrtus placoides			3	Shrub, 0.5-2.3 m high, sometimes widely spreading with several stems or branches from the base. Red-orange sandy clay, orange-yellow sandy clay to clayey loam, coarse gravel, banded ironstone, laterite, quartz, basalt. Gently undulating plains, dry creek beds, hillcrests, ridges	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Millotia depauperata			1	Slender annual, herb, to 0.2 m high. Fl. yellow, Aug to Sep. Sandy loam. Granite outcrops	B	**Unlikely** The Study Area is outside the distribution of this taxon, there are no records within 40 km of the Study Area and none of this taxon's typical habitat occurs within the Study Area.
Minuria tridens	VU		1	Dwarf virgate shrub, 0.25-0.35 m high. Fl. white-blue, Sep. Roadsides	B	**Unlikely** The Study Area is outside the distribution of this taxon, there are no records within 40 km of the Study Area and none of this taxon's typical habitat occurs within the Study Area.
Mirbelia stipitata			3	Spiny shrub, ca 0.6 m high. Fl. Aug. Red sandy loam	B	**Unlikely** The Study Area is outside the distribution of this taxon, there are no records within 40 km of the Study Area and none of this taxon's typical habitat occurs within the Study Area.

Species	Conservation Code			Habit, Flowering Period and Habitat[1]	Source[2]	Likelihood of Occurrence and Reason
	EPBC Act	WC Act	DPaW			
Neurachne lanigera			1	Tufted perennial, grass-like or herb, 0.15-0.3 m high. Fl. other, Jul to Aug or Oct. Red sand, laterite. Rocky outcrops, plains	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Olearia mucronata			3	Densely branched, unpleasantly aromatic shrub, 0.6-1 m high. Fl. white & yellow, Aug to Dec or Jan. Schistose hills, along drainage channels	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Pityrodia augustensis	VU	VU		Bushy shrub, ca 1 m high. Fl. purple/purple-red, Aug to Sep. Amongst rocks on slopes or in drainage lines	D	**Unlikely** Known to only occur in the Mt Augusta region, approximately 283 km to the north-west, with an outlier population 90 km to the north-west
Pityrodia canaliculata			1	Many stemmed shrub, (0.6-) 1-2.5 m high. Fl. white, Jun to Sep. Red sand	B	**Unlikely** The Study Area is outside the distribution of this taxon, there are no records within 40 km of the Study Area and none of this taxon's typical habitat occurs within the Study Area.
Podotheca pritzelii			3	Ascending to erect, succulent annual, herb, 0.05-0.25 m high. Fl. yellow-orange, Sep to Oct. Sand. Sand ridges in salt flats	B	**Unlikely** The Study Area is outside the distribution of this taxon, there are no records within 40 km of the Study Area and none of this taxon's typical habitat occurs within the Study Area.
Prostanthera ferricola			3	Erect, openly-branched shrub, 0.3-1 m high. Shallow red-brown skeletal sandy loam on banded ironstone, laterite, basalt or quartz. Gently inclined mid to upper slopes of hills, rocky crests, outcrops	B	**Unlikely** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Prostanthera petrophila			3	Spreading shrub, 0.6-1.5 m high. Fl. white, Aug. Lateritic soils	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Ptilotus crosslandii			3	Prostrate herb. Fl. white, Sep to Oct. Sandy soils. Colluvial plains	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.

Species	Conservation Code			Habit, Flowering Period and Habitat[1]	Source[2]	Likelihood of Occurrence and Reason
	EPBC Act	WC Act	DPaW			
Ptilotus lazaridis			3	Herb or shrub, to 0.6 m high. Fl. pink/red, Jul or Oct. Clay loam. Floodplains	B	**Possible** The Study Area is within the distribution of this taxon, and may contain suitable habitat, however there are no records within 40 km of the Study Area.
Ptilotus luteolus			3	Description unknown	B	**Possible** The Study Area is within the distribution of this taxon, and may contain suitable habitat, however there are no records within 40 km of the Study Area.
Rhodanthe sphaerocephala			1	Erect annual, herb, to 0.25 m high, with ascending branches. Fl. Oct. Clayey loam. On flats	B	**Possible** The Study Area is within the distribution of this taxon, and may contain suitable habitat, however there are no records within 40 km of the Study Area.
Sida picklesiana			3	Low shrub. Known to occur on ironstone.	B	**Possible** The Study Area is within the distribution of this taxon, and may contain suitable habitat, however there are no records within 40 km of the Study Area.
Stackhousia clementii			3	Dense broom-like perennial, herb, to 0.45 m high. Fl. green/yellow/brown. Skeletal soils. Sandstone hills	B	**Unlikely** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Stenanthemum patens			1	Shrub, ca 0.5 m high. Rocky hillside	B	**Unlikely** The Study Area is outside the distribution of this taxon and there are no records within 40 km of the Study Area.
Tecticornia cymbiformis			3	Erect, perennial shrub, 0.3-0.5 m high. Saline soils. Along the edge of creeklines	B	**Unlikely** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area, and this taxon's typical habitat does not occur within the Study Area.
Tecticornia fimbriata			3	Erect shrub, 0.25-1 m high. Clay, loam. Margins of salt & gypsum lakes	B	**Unlikely** The Study Area is outside of this taxon's distribution, there are no records within 40 km of the Study Area, and none of this taxon's typical habitat occurs within the Study Area.

Species	Conservation Code			Habit, Flowering Period and Habitat[1]	Source[2]	Likelihood of Occurrence and Reason
	EPBC Act	WC Act	DPaW			
Tecticornia sp. Lake Way (P. Armstrong 05/961)			1	Margins of salt lakes	B	**Unlikely** The Study Area is outside of this taxon's distribution, there are no records within 40 km of the Study Area, and none of this taxon's typical habitat occurs within the Study Area.
Tribulus adelacanthus			3	Prostrate herb, plants villous; leaflet pairs 3-6; fruits 5-winged, lacking spines, 10-14 mm high	B	**Unlikely** The Study Area is within the distribution of this taxon, however there are no records within 40 km of the Study Area.
Verticordia jamiesonii			3	Shrub, 0.2-0.6 m high. Fl. white/pink, Sep to Oct. Sandy clay soils. Lateritic breakaways	B	**Possible** The Study Area is within the distribution of this taxon, and may contain suitable habitat, however there are no records within 40 km of the Study Area.
Wurmbea sp. Denham Pool (F. Hort et al. 2216)			1	Description unknown	B, C	**Possible** There are records 23 km north east of the Study Area.
Xanthoparmelia nashii			3	A lichenized fungus	B	**Unlikely** The Study Area is within the broaddistribution of this taxon, and may contain suitable habitat, however there are no records within 40 km of the Study Area.

1 – Information has been obtained from Florabase (WAH 2016)

2 - Source:

A –Threatened (Declared Rare) and Priority Flora Database

B – Threatened and Priority Flora List

C – Western Australian Herbarium Specimen Database

D – EPBC Act Protected Matters Search

E – NatureMap

Appendix F Weeds identified by desktop assessment

Taxon	Common Name	Source[1]	WoNS[D]	DPP[E]	Parks and Wildlife Environmental Weed Rating[F]	
					Ecological Impact	Invasiveness
Aerva javanica	Kapok Bush	A	No	No	High	Rapid
Amaranthus caudatus	Love Lies Bleeding	A	No	No	Not assessed	
Bidens bipinnata	Bipinnate Begger's Tick	C	No	No	Unknown	Rapid
Bryophyllum delagoense	Mother of Millions	A	No	No	High	Moderate
Carrichtera annua	Wards Weed	B	No	No	Not assessed	
Cenchrus ciliaris	Buffel Grass	B	No	No	High	Rapid
Chenopodium murale	Green Fat Hen, Nettle-leaf Goosefoot	A	No	No	Unknown	Rapid
Cuscuta epithymum	Lesser Dodder	A	No	No	Unknown	Rapid
Cuscuta planiflora	Small-seeded Dodder	A	No	No	Unknown	Rapid
Lactuca serriola	Prickly Lettuce	A	No	No	Low	Rapid
Leucaena leucocephala	Leucaena	A	No	No	High	Rapid
Oxalis corniculata	Creeping Oxalis, Yellow Wood Sorrel	C	No	No	Unknown	Slow
Rostraria pumila	Rough Cat's Tail	A	No	No	Unknown	Unknown
Setaria verticillata	Whorled Pigeon Grass	A	No	No	Low	Moderate
Sisymbrium erysimoides	Smooth Mustard	A	No	No	Unknown	Unknown
Sisymbrium orientale	Indian Hedge Mustard	A	No	No	Unknown	Unknown
Solanum nigrum	Black Berry Nightshade	A	No	No	Unknown	Rapid

1 – Source:

A – NatureMap (DPaW 2016b)

B – EPBC Act Protected Matters Search (DoEE 2016)

C – Mattiske Consulting (2011)

D – Weeds of National Significance (DoEE 2017)

E – Declared Plant Pests (DAFWA 2016)

F – Midwest Region Impact and Invasiveness Ratings (DPaW 2016a)

Appendix G Quadrat and relevé locations

Site	Marked corner	Datum	Zone	Easting	Northing
GQ01	NW	GDA94	50J	679605	7084977
GQ02	NW	GDA94	50J	678335	7085337
GQ03	NW	GDA94	50J	678770	7085525
GQ04	NW	GDA94	50J	677533	7085324
GQ05	NW	GDA94	50J	677892	7086149
GQ06	NW	GDA94	50J	676536	7085811
GQ07	NW	GDA94	50J	677081	7086722
GQ08	NE	GDA94	50J	679436	7086101
GQ09	NE	GDA94	50J	678789	7086709
GQ10	NE	GDA94	50J	679148	7087211
GQ11	NE	GDA94	50J	679756	7087202
GQ12	NW	GDA94	50J	678061	7086415
GQ13	NW	GDA94	50J	678069	7087253
GQ14	NW	GDA94	50J	678014	7087989
GQ15	NW	GDA94	50J	676590	7087255
GQ16	NE	GDA94	50J	678595	7087416
GQ17	NW	GDA94	50J	677419	7088136
GQ18	NW	GDA94	50J	676564	7088472
GQ19	NE	GDA94	50J	678130	7089293
GQ20	NE	GDA94	50J	678958	7088996
GQ21	NW	GDA94	50J	678805	7088291
GQ22	NW	GDA94	50J	679050	7089419
GQ23	NW	GDA94	50J	679549	7089064
GQ24	NW	GDA94	50J	677242	7089212
GQ25	NW	GDA94	50J	677263	7089486
GQ26	NW	GDA94	50J	676657	7089500
GQ27	NE	GDA94	50J	678537	7089764
GQ28	NE	GDA94	50J	678615	7089396
GQ29	NE	GDA94	50J	678715	7086169
GQ30	NW	GDA94	50J	676800	7091052
GQ31	NW	GDA94	50J	676823	7091658
GQ32	NW	GDA94	50J	676756	7092677
GQ33	NW	GDA94	50J	676785	7093736
GQ34	NW	GDA94	50J	676506	7094245
GQ35	NW	GDA94	50J	676811	7093455
GQ36	NW	GDA94	50J	675863	7094615
GQ37	NW	GDA94	50J	674748	7095001
GQ38	NW	GDA94	50J	675167	7094717
GQ39	NW	GDA94	50J	673859	7095465
GQ40	NW	GDA94	50J	673851	7095208
GQ41	NW	GDA94	50J	674370	7095087
GQ42	NW	GDA94	50J	673186	7095676
GQ43	NW	GDA94	50J	671604	7096039
GQ44	NW	GDA94	50J	672491	7095847
GQ45	NW	GDA94	50J	670135	7096346
GQ46	NW	GDA94	50J	676733	7085093
GQ47	NW	GDA94	50J	676839	7090258
GQ48	NW	GDA94	50J	679391	7089119
GQ49	NE	GDA94	50J	679469	7086962

Site	Marked corner	Datum	Zone	Easting	Northing
GQ50	NW	GDA94	50J	670591	7096365
GQ51	NW	GDA94	50J	670868	7096118
GQ52	NW	GDA94	50J	672449	7095900
GQ53	NW	GDA94	50J	676655	7089343
GQ54	NW	GDA94	50J	673899	7095283
GQ55	NW	GDA94	50J	674889	7095133
GQ56	NW	GDA94	50J	674161	7095199
GQ57	NW	GDA94	50J	674302	7095240
GQ58	NW	GDA94	50J	675052	7094869
GQ59	NW	GDA94	50J	675162	7095078
GQ60	NW	GDA94	50J	676462	7093820
GQ61	NW	GDA94	50J	679579	7085549
GQ62	NW	GDA94	50J	676834	7089604
GQFF01	NW	GDA94	50J	673904	7095398
GR01	N/A	GDA94	50J	672711	7095633
GR02	N/A	GDA94	50J	672701	7095908
GR03	N/A	GDA94	50J	627230	7095881
GR04	N/A	GDA94	50J	672662	7095581
GR05	N/A	GDA94	50J	673103	7095765
GR06	N/A	GDA94	50J	673526	7095670
GR07	N/A	GDA94	50J	672856	7095471
GR08	N/A	GDA94	50J	675216	7094898
GR09	N/A	GDA94	50J	675088	7095099
GR10	N/A	GDA94	50J	675080	7095154
GR11	N/A	GDA94	50J	674096	7095219
GR12	N/A	GDA94	50J	675305	7094923
GR13	N/A	GDA94	50J	678848	7089719
GRFF01	N/A	GDA94	50J	675004	7094990

Appendix H Vegetation structure scale

NVIS Vegetation Structural Classifications

Cover Characteristics							
Foliage cover *	70-100	30-70	10-30	<10	≈0	0-5	unknown
Crown cover **	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
% Crown cover ***	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
Cover code	d	c	i	r	bi	bc	unknown

Growth Form	Height ranges (m)	Structural Formation Classes						
tree, palm	>30 Tall 10-30 Mid <10 Low	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
tree mallee	10-30 Tall <10 Mid <3 Low	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
shrub, cycad, grass-tree, fern	>2 Tall 1-2 Mid <1 Low	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
mallee shrub	10-30 Tall <10 Mid <3 Low	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
heath shrub	>2 Tall 1-2 Mid <1 Low	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
chenopod shrub	>2 Tall 1-2 Mid <1 Low	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs
samphire shrub	>0.5 Mid <0.5 Low	closed samphire shrubland	samphire shrubland	open samphire shrubland	sparse samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs
hummock grass	>2 Tall <2 Low	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses
tussock grass	>0.5 Mid							tussock grasses

Growth Form	Height ranges (m)	Structural Formation Classes						
	<0.5 Low	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grasses	isolated clumps of tussock grasses	
other grass	>0.5 Mid <0.5 Low	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
sedge	>0.5 Mid <0.5 Low	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
rush	>0.5 Mid <0.5 Low	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
forb	>0.5 Mid <0.5 Low	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs
fern	>2 Tall 1-2 Mid <1 Low	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumpsof ferns	ferns
bryophyte	<0.5	closed bryophyte land	bryophyte land	open bryophyte land	sparse bryophyte land	isolated bryophytes	isolated clumps of bryophytes	bryophytes
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichens
vine	>30 Tall 10-30 Mid <10 Low	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines
aquatic	<1 Tall 0-0.5 Low	closed aquatic bed	aquatic bed	open aquatic bed	sparse aquatics	isolated aquatics	isolated clumps of aquatics	aquatics
seagrass	<1 Tall 0-0.5 Low	closed seagrass bed	Seagrass bed	open seagrass bed	sparse seagrass bed	isolated seagrasses	isolated clumps of seagrasses	seagrasses

From: NVIS Structural Formation Terminology (Australian Vegetation Attribute Manual Version 6.0 August 2003 http://www.environment.gov.au/erin/nvis/publications/avam/pubs/vegetation-attribute-manual-6.pdf)

* Foliage Cover is defined for each stratum as 'the proportion of the ground, which would be shaded if sunshine came from directly overhead'. It includes branches and leaves and is similar to the Crown type of Walker & Hopkins (1990) but is applied to a stratum or plot rather than an individual crown. It is generally not directly measured in the field for the upper stratum, although it can be measured by various line interception methods for ground layer vegetation. For the attribute COVER CODE in the Stratum table, the ground cover category refers to ground foliage cover not percentage cover.

** Crown Cover (canopy cover) as per Walker & Hopkins (1990). Although relationships between the two are dependent on season, species, species age etc. (Walker & Hopkins (1990), the crown cover category classes have been adopted as the defining measure.

*** The percentage cover is defined as the percentage of a strictly defined plot area, covered by vegetation. This can be an estimate and is a less precise measure than using, for example, a point intercept transect methods on ground layer, or overstorey vegetative cover. That is for precisely measured values (e.g. crown densitometer or point intercept transects) the value measured would be 'foliage' cover. Where less precise or qualitative measures are used these will most probably be recorded as 'percentage' cover.

Appendix I Vegetation condition scale

Vegetation Condition scale adapted from Trudgen M.E. (1988)

Code	Description
E = Excellent	Pristine or nearly so; no obvious signs of damage caused by the activities of European man.
VG = Very Good	Some relatively slight damage caused by the activities of European man. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds such as **Bidens bipinnata* or **Malvastrum americanum*, or occasional vehicle tracks.
G = Good	More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones such as **Cenchrus* spp.
P = Poor	Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man, such as grazing, partial clearing (chaining) or frequent fires. Weeds as above, probably plus some more aggressive ones such as **Cenchrus* spp.
VP = Very Poor	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not without intensive management. Usually with a number of weed species including very aggressive species.
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.

Appendix J Raw quadrat and relevé data

Gnaweeda – GQ01
Described by: MS & SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 679605 mE, 7084977 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay with sand patches
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 30%
Litter: 30%
Perennial Ground Cover: 65%

Vegetation: *Acacia ?pteraneura* low woodland over *Eremophila fraseri* subsp. *fraseri* and *Eremophila forrestii* mid to low open shrubland over *Aristida contorta* sparse tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	4	35
Acacia grasbyi	2.5	0.1
Acacia mulganeura		Outside
Acacia tetragonophylla	0.4	0.1
Acacia wanyu	2.5	0.1
Aristida contorta	0.2	0.1
Aristida holathera var. *holathera*	0.5	0.1
Eremophila forrestii	1.6	5
Eremophila fraseri subsp. *fraseri*	2	7
Hibiscus sturtii var. *truncatus*	0.1	0.1
Monachather paradoxus	0.3	0.1
Ptilotus obovatus	0.6	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	1.2	0.1
Sida fibulifera	0.1	0.1
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GQ02
Described by: MS & SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678335 mE, 7085337 mN

Landform: Drainage Line
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 6-20 mm
Outcropping: No

Ground Cover
Bare Soil: 75%
Litter: 20%
Perennial Ground Cover: 50%

Vegetation: *Acacia ?paraneura* and *Acacia tetragonophylla* low woodland over *Eremophila fraseri* subsp. *fraseri*, *Eremophila forrestii* and *Eremophila latrobei* mid sparse shrubland over *Aristida contorta* sparse tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Logging

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	5	35
Acacia craspedocarpa	2.2	4
Acacia tetragonophylla	3.5	12
Aristida contorta	0.1	5
Aristida holathera var. *holathera*	0.3	0.1
Eremophila flabellata	0.5	0.1
Eremophila forrestii	1.2	1.5
Eremophila fraseri subsp. *fraseri*	1.8	4
Eremophila granitica	0.2	0.1
Eremophila latrobei	1.2	1
Sida ectogama	1.2	0.5

Gnaweeda – GQ03
Described by: MS & SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678770 mE, 7085525 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand with patches of medium clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 60%
Litter: 5%
Perennial Ground Cover: 45%

Vegetation: *Acacia ?paraneura* low woodland over *Senna artemisioides* subsp. *helmsii* and *Eremophila forrestii* mid open shrubland over *Eragrostis eriopoda* sparse tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	15
Acacia mulganeura	1.5	1
Eragrostis eriopoda	0.4	2
Eremophila flabellata	0.3	0.1
Eremophila forrestii	1.5	5
Eremophila latrobei	1.3	0.1
Marsdenia australis	0.1	0.1
Senna artemisioides subsp. *helmsii*	1.6	6
Senna artemisioides subsp. *x sturtii*	1.2	0.1

Gnaweeda – GQ04
Described by: MS & SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 677533 mE, 7085324 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand with patches of medium clay
Soil Colour: Orange
Rock Type: N/A

Coarse Surface Particles
Site Coverage: 0%
Size: N/A
Outcropping: No

Ground Cover
Bare Soil: 15%
Litter: 30%
Perennial Ground Cover: 70%

Vegetation: *Acacia ?paraneura* and *Acacia mulganeura* low woodland over *Eremophila forrestii* mid to low shrubland over *Monachather paradoxus* sparse tussock grassland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing
Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	5	30
Acacia mulganeura	5	30
Eremophila flabellata	0.3	0.1
Eremophila forrestii	1.8	35
Monachather paradoxus	0.6	5
Psydrax rigidula	0.4	0.1
Psydrax suaveolens	1.8	0.1
Sida sp.	0.7	0.1
Solanum lasiophyllum	0.5	0.1
Spartothamnella teucriiflora	0.8	0.1

Gnaweeda – GQ05
Described by: MS & SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 677892 mE, 7086149 mN

Landform: Drainage Line
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: 10-20%
Size: 2-20 mm
Outcropping: No

Ground Cover
Bare Soil: 50%
Litter: 30%
Perennial Ground Cover: 35%

Vegetation: *Acacia ?paraneura*, *Acacia mulganeura* and *Acacia tetragonophylla* low woodland over *Eremophila fraseri* subsp. *fraseri* mid to low sparse shrubland over *Aristida contorta* sparse tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Logging

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	5	2
Acacia craspedocarpa	3	0.1
Acacia mulganeura	4	25
Acacia tetragonophylla	3	5
Aristida contorta	0.1	5
Eremophila forrestii	0.5	0.1
Eremophila fraseri subsp. *fraseri*	2	1
Eremophila granitica	0.3	0.1
Hibiscus sturtii var. *truncatus*	0.1	0.1
Marsdenia australis	0.1	0.1
Solanum lasiophyllum	0.2	0.1
Spartothamnella teucriiflora		Outside

Gnaweeda – GQ06
Described by: MS Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676536 mE, 7085811 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 70%
Litter: 1%
Perennial Ground Cover: 25%

Vegetation: *Acacia ?paraneura* (and *Acacia mulganeura*) low open woodland over *Eremophila fraseri* subsp. *fraseri* and *Eremophila forrestii* mid sparse shrubland over *Eremophila flabellata*, *Solanum lasiophyllum* and *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing
Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	15
Acacia mulganeura		Outside
Acacia tetragonophylla	1.2	1
Eremophila flabellata	0.3	1
Eremophila forrestii	1.3	5
Eremophila fraseri subsp. *fraseri*	1.5	5
Maireana tomentosa	0.3	0.1
Ptilotus obovatus	0.4	0.1
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GQ07
Described by: MS Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 677081 mE, 7086722 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 40%
Litter: 5%
Perennial Ground Cover: 65%

Vegetation: *Acacia ?paraneura* with occasional *Acacia pruinocarpa* low woodland over *Eremophila forrestii* mid shrubland over *Eragrostis eriopoda* sparse tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Feral scats

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	5	12
Acacia pruinocarpa	4	2
Eragrostis eriopoda	0.3	1
Eremophila flabellata	0.3	0.1
Eremophila forrestii	1.6	40
Eremophila fraseri subsp. *fraseri*		Outside
Hibiscus sturtii var. *truncatus*	0.3	0.1
Monachather paradoxus	0.4	0.1
Ptilotus obovatus	0.3	0.1
Senna artemisioides subsp. *oligophylla x helmsii*	1.8	0.1
Sida sp. *dark green fruits* (S. van Leeuwen 2260)	0.5	0.1
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GQ08

Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 679436 mE, 7086101 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay with sand patches
Soil Colour: Orange
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 90%
Litter: 2%
Perennial Ground Cover: 10%

Vegetation: *Acacia fuscaneura* and *Acacia pruinocarpa* low open woodland over *Senna* sp. and *Acacia ?paraneura* mid open shrubland over *Eremophila forrestii* and *Eremophila jucunda* subsp. *jucunda* low open shrubland over *Eragrostis eriopoda* scattered tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	1.5	1
Acacia fuscaneura	2.2	3
Acacia pruinocarpa	3	1
Eragrostis eriopoda	0.2	1
Eremophila forrestii	1	0.5
Eremophila fraseri subsp. *fraseri*	0.4	0.1
Eremophila jucunda subsp. *jucunda*	0.5	1
Hibiscus sturtii var. *truncatus*	0.1	0.1
Ptilotus obovatus	0.5	0.5
Senna sp.	2.1	2

Gnaweeda – GQ09

Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678789 mE, 7086709 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay with sand patches
Soil Colour: Orange
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 6-20 mm
Outcropping: No

Ground Cover
Bare Soil: 70%
Litter: 8%
Perennial Ground Cover: 40%

Vegetation: *Acacia ?paraneura* low open woodland over *Eremophila forrestii* and *Eremophila fraseri* subsp. *fraseri* mid open shrubland over *Eragrostis eriopoda* low tussock grassland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	2.5	22
Acacia tetragonophylla	0.2	0.1
Eragrostis eriopoda	0.2	1
Eremophila forrestii	2	20
Eremophila fraseri subsp. *fraseri*	2.2	2
Ptilotus obovatus	0.5	0.1
Senna artemisioides subsp. *helmsii*	1.2	1

Gnaweeda – GQ10
Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 679148 mE, 7087211 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Light orange/brown
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 6-20 mm
Outcropping: No

Ground Cover
Bare Soil: 85%
Litter: 4%
Perennial Ground Cover: 16%

Vegetation: *Acacia fuscaneura* and *Acacia mulganeura* low woodland over *Eremophila fraseri* subsp. *fraseri* mid open shrubland over *Ptilotus obovatus* low scattered shrubs

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing, Logging

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	0.5	0.1
Acacia fuscaneura	4	6
Acacia mulganeura	3	5
Acacia tetragonophylla	2.5	2
Eremophila fraseri subsp. *fraseri*	3	2.5
Eremophila granitica	0.8	0.5
Eremophila spectabilis subsp. *spectabilis*	0.8	0.5
Ptilotus obovatus	0.8	0.5
Sida ectogama	0.9	0.5
Solanum lasiophyllum	0.5	0.1

Gnaweeda – GQ11

Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)

GPS Co-ordinate: 50J 679756 mE, 7087202 mN

Landform: Plain
Slope: Level (0-3°)

Soils

Soil Texture: Heavy clay
Soil Colour: Light orange/brown
Rock Type: Ironstone, Quartzite

Coarse Surface Particles

Site Coverage: <2%
Size: 6-20 mm
Outcropping: No

Ground Cover

Bare Soil: 97%
Litter: 1%
Perennial Ground Cover: 3%

Vegetation: *Acacia mulganeura* and *Ptilotus obovatus* low open shrubland over *Sclerolaena densiflora* sparse dwarf chenopod shrubland

General Notes: Lots of dead shrubs and grasses, very dry claypan.

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia caesaneura	0.5	0.1
Acacia mulganeura	0.4	0.5
Acacia ramulosa var. *linophylla*	0.4	0.5
Aristida contorta	0.1	0.1
Eremophila fraseri subsp. *fraseri*	0.3	0.1
Eremophila spectabilis subsp. *spectabilis*	0.3	0.1
Hakea preissii	0.2	0.1
Maireana carnosa	0.05	0.1
Ptilotus obovatus	0.4	2
Sclerolaena densiflora	0.05	1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ12
Described by: MS & SF Date: 12/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678061 mE, 7086415 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Light orange/brown
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 6-20 mm
Outcropping: No

Ground Cover
Bare Soil: 80%
Litter: 10%
Perennial Ground Cover: 20%

Vegetation: *Acacia ?paraneura* low woodland over *Eremophila fraseri* subsp. *fraseri* and *Eremophila forrestii* and *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Clearing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	15
Acacia tetragonophylla	0.3	0.1
Aristida contorta	0.1	0.1
Eremophila flabellata	0.3	0.1
Eremophila forrestii	1	3
Eremophila fraseri subsp. *fraseri*	1.3	2
Eremophila granitica	0.2	0.1
Eremophila jucunda subsp. *jucunda*	0.3	0.1
Hibiscus sturtii var. *truncatus*	0.1	0.1
Psydrax rigidula	1.8	0.1
Ptilotus obovatus	0.6	1
Sclerolaena densiflora	0.1	0.1
Senna glaucifolia	1.1	1
Solanum lasiophyllum	0.4	0.1

Gnaweeda – GQ13
Described by: MS & SF Date: 12/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678069 mE, 7087253 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Light orange/brown
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-20 mm
Outcropping: No

Ground Cover
Bare Soil: 75%
Litter: 15%
Perennial Ground Cover: 13%

Vegetation: *Acacia ?paraneura* low open woodland over *Eremophila forrestii*, *Eremophila fraseri* subsp. *fraseri* and *Ptilotus obovatus* mid to low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Logging

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	2	10
Acacia mulganeura	1.1	4
Aristida sp.	0.2	0.1
Dysphania rhadinostachya	0.1	0.1
Eremophila forrestii	1.8	2
Eremophila fraseri subsp. *fraseri*	1.1	1
Eremophila latrobei	0.7	0.1
Eremophila spectabilis subsp. *spectabilis*	0.3	1
Hibiscus sturtii var. *truncatus*	0.1	0.1
Maireana tomentosa	0.1	0.1
Marsdenia australis	0.2	0.1
Psydrax rigidula	0.8	0.1
Ptilotus obovatus	0.4	0.5
Sclerolaena densiflora	0.1	0.1
Senna sp.	0.3	0.1
Solanum lasiophyllum	0.3	0.1
Spartothamnella teucriiflora	0.5	Outside

Gnaweeda – GQ14
Described by: MS & SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678014 mE, 7087989 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Light orange/brown
Rock Type: N/A

Coarse Surface Particles
Site Coverage: 0%
Size: N/A
Outcropping: No

Ground Cover
Bare Soil: 55%
Litter: 20%
Perennial Ground Cover: 50%

Vegetation: *Acacia ?paraneura* low woodland over *Eremophila spectabilis* subsp. *spectabilis*, *Eremophila forrestii* and *Eremophila latrobei* mid sparse shrubland over *Ptilotus obovatus* low open shrubland

General Notes: Lots of dead annuals.

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	5	25
Acacia mulganeura	0.6	0.1
Acacia tetragonophylla	0.8	0.1
Aristida contorta	0.1	0.1
Cheilanthes sieberi subsp. *sieberi*	0.1	0.1
Eragrostis eriopoda	0.2	0.1
Eremophila forrestii	1.8	1
Eremophila granitica	0.2	0.1
Eremophila latrobei	1.8	1
Eremophila spectabilis subsp. *spectabilis*	0.5	1
Euphorbia drummondii	0.05	0.1
Keraudrenia velutina	0.5	0.1
Maireana carnosa	0.05	0.1
Maireana tomentosa	0.2	0.1
Psydrax rigidula	1.6	0.1

Species Name	Height (m)	Cover (%)
Ptilotus obovatus	0.7	15
Sclerolaena diacantha	0.1	0.1
Sida fibulifera	0.1	0.1
Solanum lasiophyllum	0.2	0.1
Spartothamnella teucriiflora	0.2	0.1

Gnaweeda – GQ15
Described by: MS & SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676590 mE, 7087255 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Light orange/brown
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-20 mm
Outcropping: No

Ground Cover
Bare Soil: 80%
Litter: 2%
Perennial Ground Cover: 25%

Vegetation: *Acacia ?paraneura* low woodland over *Eremophila fraseri* subsp. *fraseri* and *Acacia tetragonophylla* mid sparse shrubland over *Sida ectogama* and *Ptilotus obovatus* low sparse shrubland with *Aristida holathera* var. *holathera* and *Aristida contorta* sparse tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	20
Acacia tetragonophylla	2.5	3
Aristida contorta	0.1	1
Aristida holathera var. *holathera*	0.6	1
Eremophila fraseri subsp. *fraseri*	2.2	5
Hibiscus sturtii var. *truncatus*	0.1	0.1
Maireana tomentosa	0.2	0.1
Psydrax rigidula	0.5	0.1
Ptilotus obovatus	0.5	4
Senna artemisioides subsp. *oligophylla x helmsii*	1	1
Senna artemisioides subsp. *x sturtii*	0.5	0.1
Sida ectogama	1.2	2
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ16
Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678595 mE, 7087416 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Heavy clay
Soil Colour: Light orange/brown
Rock Type: Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-20 mm
Outcropping: No

Ground Cover
Bare Soil: 80%
Litter: 5%
Perennial Ground Cover: 30%

Vegetation: *Acacia ?paraneura* with *Acacia mulganeura* low open woodland over *Eremophila fraseri* subsp. *fraseri* low open shrubland over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	5	10
Acacia fuscaneura	1.2	0.5
Acacia mulganeura	4.5	7
Acacia tetragonophylla	2.2	1.5
Eremophila fraseri subsp. *fraseri*	2	5
Eremophila spectabilis subsp. *spectabilis*	1	1
Maireana tomentosa	0.3	0.1
Psydrax suaveolens	1	0.1
Ptilotus obovatus	0.6	1
Spartothamnella teucriiflora	0.3	0.5

Gnaweeda – GQ17
Described by: MS Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 677419 mE, 7088136 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay with sand patches
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 80%
Litter: 3%
Perennial Ground Cover: 20%

Vegetation: *Acacia ?paraneura* low woodland over *Eremophila forrestii* mid sparse shrubland over *Ptilotus obovatus* low sparse shrubland over *Eragrostis eriopoda* sparse tussock grassland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	4	15
Acacia mulganeura	1.5	0.1
Acacia tetragonophylla	0.4	0.1
Aristida contorta	0.1	0.1
Eragrostis eriopoda	0.1	1
Eremophila forrestii	0.7	1
Hibiscus sturtii var. *truncatus*	0.1	0.1
Maireana tomentosa	0.3	0.1
Psydrax rigidula	2	0.1
Ptilotus obovatus	0.6	0.5
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ18

Described by: SF Date: 13/10/2016 Type: Quadrat (20 x 20m)

GPS Co-ordinate: 50J 676564 mE, 7088472 mN

Landform: Plain

Slope: Level (0-3°)

Soils

Soil Texture: Medium clay

Soil Colour: Light orange/brown

Rock Type: Quartzite

Coarse Surface Particles

Site Coverage: <2%

Size: 2-60 mm

Outcropping: No

Ground Cover

Bare Soil: 75%

Litter: 10%

Perennial Ground Cover: 65%

Vegetation: *Acacia ?paraneura*, *Acacia mulganeura* and *Acacia craspedocarpa* low open woodland over *Eremophila forrestii* and *Eremophila fraseri* subsp. *fraseri* mid open shrubland over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	5	50
Acacia craspedocarpa	2.2	3
Acacia mulganeura	6	4
Acacia tetragonophylla	2	2
Aristida contorta	0.1	0.1
Eremophila forrestii	1.5	2
Eremophila fraseri subsp. *fraseri*	1	1.5
Eremophila latrobei	1.4	0.5
Keraudrenia velutina	0.5	0.1
Ptilotus obovatus	0.8	0.1
Sida fibulifera	0.1	0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ19
Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678130 mE, 7089293 mN

Landform: Drainage Line
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Basalt, Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 20-600 mm
Outcropping: No

Ground Cover
Bare Soil: 15%
Litter: 50%
Perennial Ground Cover: 75%

Vegetation: *Acacia ?paraneura* and *Acacia fuscaneura* low closed woodland over *Eremophila fraseri* subsp. *fraseri* mid open shrubland over *Ptilotus obovatus* low open shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	8	30
Acacia fuscaneura	6	15
Acacia pruinocarpa	8	8
Eremophila flabellata	0.4	0.1
Eremophila forrestii	1.2	0.1
Eremophila fraseri subsp. *fraseri*	3	5
Keraudrenia velutina	1.8	1
Psydrax rigidula	0.4	0.5
Psydrax suaveolens	1.2	0.1
Ptilotus obovatus	1.1	30
Solanum lasiophyllum	0.4	0.1

Gnaweeda – GQ20

Described by: SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678958 mE, 7088996 mN

Landform: Drainage Line
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 20-60 mm
Outcropping: No

Ground Cover
Bare Soil: 10%
Litter: 85%
Perennial Ground Cover: 95%

Vegetation: *Acacia ?paraneura* mid to low closed woodland over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	12	90
Acacia pruinocarpa	8	Outside
Eremophila flabellata	1	0.5
Eremophila fraseri subsp. *fraseri*	2	1
Eremophila spectabilis subsp. *spectabilis*	1.3	1
Psydrax suaveolens	1.2	1
Ptilotus obovatus	1.1	5
Solanum lasiophyllum	0.5	0.1

Gnaweeda – GQ21
Described by: MS Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678805 mE, 7088291 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay with sand patches
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 80%
Litter: 2%
Perennial Ground Cover: 15%

Vegetation: *Acacia ?paraneura* low open woodland over *Acacia tetragonophylla* mid to low sparse shrubland over *Eremophila flabellata* and *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Feral scats

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	12
Acacia tetragonophylla	2	1
Aristida contorta	0.1	0.1
Eragrostis eriopoda	0.2	0.1
Eremophila flabellata	0.3	0.1
Eremophila forrestii	0.5	0.1
Hibiscus sturtii var. *truncatus*	0.2	0.1
Maireana tomentosa	0.3	0.1
Marsdenia australis	0.1	0.1
Monachather paradoxus	0.1	0.1
Ptilotus obovatus	0.3	2
Rhagodia eremaea	0.7	0.1
Sclerolaena densiflora	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *helmsii*	0.6	0.1
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GQ22
Described by: MS Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 679050 mE, 7089419 mN

Landform: Low stony rise
Slope: Gently inclined (3-5°)

Soils
Soil Texture: Heavy clay
Soil Colour: Orange
Rock Type: Ironstone

Coarse Surface Particles
Site Coverage: >90%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 2%
Litter: 2%
Perennial Ground Cover: 20%

Vegetation: *Acacia ?pteraneura*, (*Acacia ?paraneura*) and *Acacia pruinocarpa* tall sparse shrubland over *Acacia grasbyi* and *Acacia tetragonophylla* mid sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	4	2
Acacia grasbyi	2	4
Acacia pruinocarpa	2.5	8
Acacia tetragonophylla	2	1
Cratystylis subspinescens		Outside
Eremophila jucunda subsp. *jucunda*	0.3	0.1
Eremophila macmillaniana	0.6	0.1
Eremophila spathulata	0.6	2
Maireana georgei	0.4	0.1
Maireana melanocoma	0.3	0.1
Psydrax latifolia	0.2	0.1
Psydrax rigidula	0.7	0.1
Ptilotus rotundifolius	0.7	0.1
Ptilotus schwartzii	0.2	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)		Outside
Sida ectogama	0.5	0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ23
Described by: MS Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 679549 mE, 7089064 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 5%
Litter: 60%
Perennial Ground Cover: 80%

Vegetation: *Acacia ?paraneura* low closed woodland over *Eremophila fraseri* subsp. *fraseri* and *Acacia tetragonophylla* tall to mid open shrubland over *Ptilotus obovatus* low open shrubland

General Notes: There is a large *Acacia pruinocarpa* in the quadrat with a high percentage cover, and while dominant in the surrounding vegetation, the overall cover for this taxon in is lower than indicated by the quadrat records.

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	6	60
Acacia pruinocarpa	5	10
Acacia tetragonophylla	2.5	1
Aristida contorta	0.2	0.1
Eremophila flabellata	1.3	0.1
Eremophila fraseri subsp. *fraseri*	2.5	5
Keraudrenia velutina	1.2	0.1
Psydrax latifolia	1.2	0.1
Psydrax rigidula	1.2	0.1
Ptilotus obovatus	1.2	10
Rhagodia eremaea	0.5	0.1
Santalum spicatum	3	3
Solanum lasiophyllum	0.2	0.1
Spartothamnella teucriiflora	0.5	0.1

Gnaweeda – GQ24
Described by: MS Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 677242 mE, 7089212 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand with patches of medium clay
Soil Colour: Orange
Rock Type: Ironstone, Sandstone

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 70%
Litter: 5%
Perennial Ground Cover: 45%

Vegetation: *Acacia ?paraneura* and *Acacia mulganeura* low woodland over *Eremophila forrestii* mid to low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	35
Acacia mulganeura	5	10
Aristida contorta	0.1	0.1
Eragrostis eriopoda	0.1	0.1
Eremophila flabellata	0.6	1
Eremophila forrestii	1.5	4
Eremophila latrobei	0.5	0.1
Hibiscus sturtii var. *truncatus*	0.2	0.1
Maireana tomentosa	1.5	0.1
Marsdenia australis	0.1	0.1
Psydrax suaveolens	1.4	0.1
Senna sp.	1.5	0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ25

Described by: MS & SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 677263 mE, 7089486 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 6-60 mm
Outcropping: No

Ground Cover
Bare Soil: 65%
Litter: 4%
Perennial Ground Cover: 30%

Vegetation: *Acacia ?paraneura* low woodland over *Eremophila fraseri* subsp. *fraseri* mid sparse shrubland over *Eremophila flabellata* mid sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	25
Acacia craspedocarpa	2	2
Acacia tetragonophylla	3	2
Aristida contorta	0.1	0.1
Eremophila flabellata	0.4	3
Eremophila forrestii	0.7	0.1
Eremophila fraseri subsp. *fraseri*	2.5	3
Eremophila latrobei	1.5	0.1
Hibiscus sturtii var. *truncatus*	0.1	0.1
Monachather paradoxus	0.3	0.1
Sida ectogama	0.7	1
Solanum lasiophyllum	0.3	0.1
Spartothamnella teucriiflora	0.5	0.1

Gnaweeda – GQ26
Described by: MS & SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676657 mE, 7089500 mN

Landform: Claypan plain
Slope: Level (0-3°)

Soils
Soil Texture: Heavy clay
Soil Colour: Orange
Rock Type: Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: 10-20%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 40%
Litter: 40%
Perennial Ground Cover: 10%

Vegetation: *Acacia mulganeura*, *Acacia tetragonophylla* and *Acacia craspedocarpa* tall to mid sparse shrubland over mixed dead tussock grassland

General Notes: Vegetation description for the broader claypan is: *Hakea lorea* subsp.*lorea*, *{Acacia tetragonophylla}* and Acacia mulganeura tall to mid isolated trees over mixed dead tussock grassland.

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia craspedocarpa	2	2
Acacia mulganeura	3	3
Acacia tetragonophylla	2.8	2
Eremophila flabellata		Outside
Eremophila fraseri subsp. *fraseri*		Outside
Hakea lorea subsp. *lorea*		Outside
Solanum lasiophyllum	0.4	0.1

Gnaweeda – GQ27
Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678537 mE, 7089764 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Basalt, Ironstone

Coarse Surface Particles
Site Coverage: >90%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 5%
Litter: 0.1%
Perennial Ground Cover: 15%

Vegetation: *Acacia ?paraneura* low open woodland over *Eremophila fraseri* subsp. *fraseri* mid sparse shrubland over *Eremophila spathulata* and *Eremophila macmillaniana* low open shrubland over *Sclerolaena eriacantha* dwarf chenopod shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	2.2	2
Acacia ramulosa var. *linophylla*	0.5	0.5
Eremophila fraseri subsp. *fraseri*	1	1
Eremophila macmillaniana	0.6	1.5
Eremophila spathulata	0.5	3
Maireana georgei	0.1	0.1
Ptilotus obovatus	0.3	0.5
Ptilotus roei	0.05	0.1
Sclerolaena cuneata	0.1	0.1
Sclerolaena eriacantha	0.05	0.5
Senna artemisioides subsp. *x artemisioides*		Outside
Senna sp. *Meekatharra* (E. Bailey 1-26)	0.5	0.5

Gnaweeda – GQ28
Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678615 mE, 7089396 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-600 mm
Outcropping: No

Ground Cover
Bare Soil: 8%
Litter: 0.1%
Perennial Ground Cover: 6%

Vegetation: *Acacia fuscaneura* with *Acacia incurvaneura* x *mulganeura* low sparse shrubland over *Eremophila spathulata*, *Ptilotus obovatus* and *Ptilotus schwartzii* low sparse shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia fuscaneura	2.2	1
Acacia incurvaneura x mulganeura	2	2
Acacia tetragonophylla	1.5	0.1
Eremophila flabellata	0.3	0.1
Eremophila macmillaniana	0.1	0.1
Eremophila spathulata	1	1.5
Goodenia ? tenuiloba	0.05	0.1
Maireana georgei	0.05	0.1
Ptilotus obovatus	1	1.5
Ptilotus schwartzii	0.2	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	1	0.5
Tribulus macrocarpus	0.05	0.1

Gnaweeda – GQ29
Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 678715 mE, 7086169 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay with sand patches
Soil Colour: Orange
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 6-200 mm
Outcropping: No

Ground Cover
Bare Soil: 75%
Litter: 4%
Perennial Ground Cover: 28%

Vegetation: *Acacia ?paraneura* and *Acacia fuscaneura* low open woodland over *Eremophila forrestii* and *Eremophila fraseri* subsp. *fraseri* mid to low open shrubland over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Fire, Logging

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	4	15
Acacia fuscaneura	3	3
Acacia tetragonophylla	0.2	0.1
Eremophila forrestii	2	5
Eremophila fraseri subsp. *fraseri*	1	2
Eremophila glutinosa	0.3	0.1
Eremophila granitica	0.2	0.1
Poaceae sp.	0.3	0.1
Ptilotus obovatus	0.5	1
Sclerolaena densiflora	0.05	0.1
Senna artemisioides subsp. *helmsii*	2	2
Senna artemisioides subsp. *oligophylla x helmsii*	0.2	0.1
Senna sp.	1.5	0.5
Sida platycalyx		0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ30

Described by: MS Date: 17/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676800 mE, 7091052 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange
Rock Type: Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: 10-20%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 25%
Litter: 5%
Perennial Ground Cover: 30%

Vegetation: *Acacia ?paraneura* and *Acacia mulganeura* low open woodland over *Eremophila latrobei* and *Ptilotus schwartzii* low sparse shrubland over *Monachather paradoxus* sparse tussock grassland

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	20
Acacia ? pteraneura		Outside
Acacia cockertoniana		Outside
Acacia mulganeura	3	5
Acacia sp.	3	5
Eremophila glutinosa	0.4	0.1
Eremophila latrobei	0.6	0.1
Euphorbia boophthona	0.4	0.1
Grevillea berryana		Outside
Monachather paradoxus	0.4	0.1
Psydrax latifolia	2	0.5
Psydrax rigidula	0.6	0.1
Psydrax suaveolens	0.3	0.1
Ptilotus schwartzii	0.4	0.1
Solanum lasiophyllum	0.6	0.1

Gnaweeda – GQ31
Described by: MS Date: 17/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676823 mE, 7091658 mN

Landform: Drainage Line
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange/brown
Rock Type: Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: 10-20%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 20%
Litter: 15%
Perennial Ground Cover: 40%

Vegetation: *Acacia ?paraneura* low woodland over *Eremophila forrestii* mid open shrubland over *Maireana tomentosa* low chenopod shrubland with sparse dead tussock grassland

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	30
Acacia ? pteraneura		Outside
Acacia minyura		Outside
Acacia mulganeura		Outside
Acacia ramulosa var. *linophylla*	2	0.5
Acacia sp.		Outside
Eragrostis eriopoda	0.4	0.1
Eremophila forrestii	1.6	5
Eremophila fraseri subsp. *fraseri*	1.5	1
Eremophila glutinosa	1.2	1
Eremophila latrobei	1.6	0.1
Grevillea berryana	2	1
Hibiscus sturtii var. *truncatus*	0.3	0.1
Maireana tomentosa	0.6	1
Mirbelia rhagodioides		Outside
Psydrax latifolia	2	0.5
Psydrax rigidula	1.2	0.1

Species Name	Height (m)	Cover (%)
Senna glaucifolia	1.6	0.1
Senna glaucifolia x	1.8	0.1
Sida fibulifera	0.1	0.1
Solanum cleistogamum	0.2	0.1
Solanum lachnophyllum	1.8	0.1
Solanum lasiophyllum	0.5	0.1

Gnaweeda – GQ32
Described by: MS & SF Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676756 mE, 7092677 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Basalt, Granite, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 40%
Litter: 3%
Perennial Ground Cover: 25%

Vegetation: *Acacia ?paraneura* low open woodland over *Eremophila latrobei* and *Eremophila glutinosa* mid sparse shrubland over *Ptilotus schwartzii* and *Eremophila compacta* subsp. *compacta* low sparse shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3.5	20
Acacia ? pteraneura	2	2
Acacia ramulosa var. *linophylla*	0.7	0.1
Acacia sp.	3	2
Aluta maisonneuvei subsp. *auriculata*	0.3	0.1
Aristida contorta	0.1	0.1
Eremophila glutinosa	1.4	1
Eremophila jucunda subsp. *jucunda*	0.3	0.1
Eremophila latrobei	1.1	1
Goodenia tenuiloba	0.1	0.1
Maireana sp.	0.05	0.1
Monachather paradoxus	0.1	0.1
Poaceae sp.	0.2	0.1
Psydrax latifolia	0.2	0.1
Psydrax rigidula	0.4	0.1
Ptilotus schwartzii	0.2	0.5
Solanum lasiophyllum	0.1	0.1

Gnaweeda – GQ33
Described by: MS Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676785 mE, 7093736 mN

Landform: Drainage Line
Slope: Level (0-3°)

Soils
Soil Texture: Sandy silt
Soil Colour: Orange
Rock Type: Ironstone, Quartzite, Riverstones

Coarse Surface Particles
Site Coverage: <2%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 55%
Litter: 5%
Perennial Ground Cover: 45%

Vegetation: *Acacia ?paraneura* (and *Acacia ?pteraneura*) low woodland over *Acacia tetragonophylla*, *Acacia ?pteraneura* and *Eremophila fraseri* subsp. *fraseri* mid open shrubland over *Ptilotus obovatus* and mixed *Eremophila* species low sparse shrubland

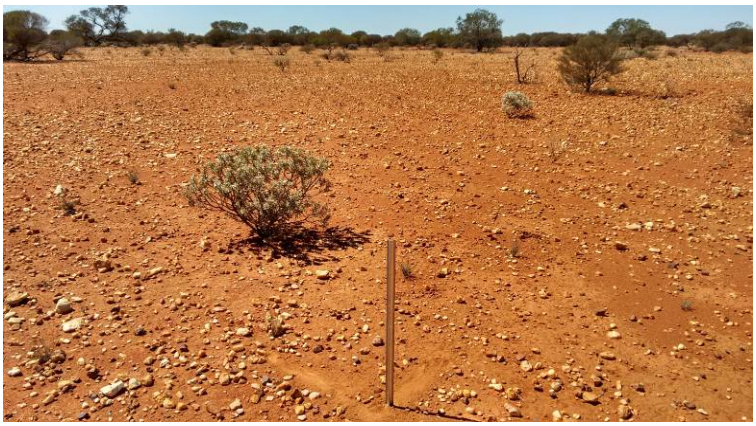
Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	4	35
Acacia ? pteraneura	1.2	1
Acacia aneura	1.6	0.1
Acacia mulganeura	2.2	1
Acacia tetragonophylla	2	1
Aristida contorta	0.1	0.1
Eragrostis eriopoda	0.1	0.1
Eremophila exilifolia	0.4	0.1
Eremophila forrestii	1.2	0.1
Eremophila fraseri subsp. *fraseri*	2	1
Eremophila glutinosa	0.4	0.1
Eremophila latrobei	0.7	0.1
Eremophila macmillaniana	0.3	0.1
Maireana tomentosa subsp. *tomentosa*	0.2	0.1
Maireana villosa	0.1	0.1
Psydrax latifolia	0.4	0.1

Species Name	Height (m)	Cover (%)
Ptilotus obovatus	0.3	0.1
Ptilotus schwartzii	0.1	0.1
Rhagodia eremaea	0.5	0.1
Sclerolaena diacantha	0.1	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	1.5	0.5
Sida fibulifera	0.1	0.1
Solanum lasiophyllum	0.3	0.1
Spartothamnella teucriiflora	0.7	0.1

Gnaweeda – GQ34
Described by: MS & SF Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676506 mE, 7094245 mN



Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Light orange/brown
Rock Type: Basalt, Granite, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 65%
Litter: 0.1%
Perennial Ground Cover: 4%

Vegetation: *Acacia ?pteraneura* mid sparse shrubland over *Eremophila spathulata*, *Eremophila fraseri* subsp. *fraseri* and *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing, Feral trampling, Tracks

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	1.7	1.5
Aristida contorta	0.1	0.1
Eremophila compacta subsp. *compacta*	0.2	0.1
Eremophila fraseri subsp. *fraseri*	0.2	0.1
Eremophila glutinosa	0.2	0.1
Eremophila latrobei	0.2	0.1
Eremophila spathulata	0.8	1
Goodenia tenuiloba	0.1	0.1
Maireana georgei	0.2	0.1
Maireana tomentosa subsp. *tomentosa*	0.2	0.1
Ptilotus roei	0.05	0.1
Ptilotus schwartzii	0.3	0.5
Sclerolaena tetragona	0.1	0.1
Sida ectogama	0.2	0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ35

Described by: MS & SF Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676811 mE, 7093455 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay with sand patches
Soil Colour: Orange
Rock Type: Basalt, Granite, Quartzite

Coarse Surface Particles
Site Coverage: 10-20%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 80%
Litter: 0.1%
Perennial Ground Cover: 5%

Vegetation: *Acacia ?pteraneura* low open woodland over *Eremophila fraseri* subsp. *fraseri* mid sparse shrubland over *Monachather paradoxus* and *Aristida contorta* sparse tussock grassland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	3	2
Acacia mulganeura	0.5	0.1
Aristida contorta	0.1	0.1
Eremophila forrestii	0.6	0.1
Eremophila fraseri subsp. *fraseri*	1	1
Eremophila glutinosa	0.7	0.1
Eremophila latrobei	0.3	0.1
Maireana tomentosa subsp. *tomentosa*	0.1	0.1
Maireana villosa	0.2	0.1
Monachather paradoxus	0.1	0.1
Ptilotus obovatus	0.5	0.1
Ptilotus roei	0.05	0.1
Ptilotus schwartzii	0.2	0.1
Sclerolaena tetragona	0.1	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	0.6	0.1
Solanum lasiophyllum	0.3	0.1
Stenopetalum anfractum	0.1	0.1

Gnaweeda – GQ36

Described by: MS & SF Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 675863 mE, 7094615 mN

Landform: Plain with low outcropping
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange
Rock Type: Granite, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 55%
Litter: 0.1%
Perennial Ground Cover: 9%

Vegetation: *Acacia ?pteraneura* mid sparse shrubland over *Eremophila spathulata* and *Ptilotus obovatus* low sparse shrubland

General Notes: There are some open patches that do not have an *Acacia ?pteraneura* overstorey and *Eremophila spathulata* and *Ptilotus obovatus* are present but sparse. These sparse areas also have less or no outcropping.

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	1.2	1
Aristida contorta	0.1	0.1
Cymbopogon ambiguus	0.1	0.1
Eremophila compacta subsp. *compacta*	0.2	0.1
Eremophila spathulata	0.6	2
Goodenia tenuiloba	0.1	0.1
Maireana tomentosa	0.3	0.1
Ptilotus obovatus	0.3	1
Ptilotus roei	0.1	0.1
Ptilotus schwartzii	0.2	0.1
Solanum lasiophyllum	0.4	0.1

Gnaweeda – GQ37
Described by: MS Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 674748 mE, 7095001 mN

Landform: Drainage Line
Slope: Level (0-3Â°)

Soils
Soil Texture: Clay loam
Soil Colour: Brown
Rock Type: Calcrete

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 10%
Litter: 30%
Perennial Ground Cover: 80%

Vegetation: *Acacia ?paraneura*, *Acacia ?pteraneura* and *Acacia mulganeura* low closed woodland over *Harnieria kempeana* subsp. *muelleri*, *Eremophila glutinosa* and *Dodonaea pachyneura* mid shrubland over mixed dead tussock grassland

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Abutilon sp.	0.1	0.1
Acacia ? paraneura	4	40
Acacia ? pteraneura	6	10
Acacia mulganeura	4	1
Acacia ramulosa var. *ramulosa*	1.6	1
Acacia tetragonophylla	0.3	0.1
Dodonaea pachyneura	1.6	0.1
Eremophila flabellata	0.3	0.1
Eremophila fraseri subsp. *fraseri*	0.3	0.1
Eremophila glutinosa	0.6	0.1
Eremophila latrobei	0.6	0.1
Grevillea deflexa	1.8	0.1
Harnieria kempeana subsp. *muelleri*	0.6	2
Psydrax latifolia	0.5	0.1
Psydrax rigidula	1.2	0.1
Senna artemisioides subsp. *helmsii*	1.2	0.1

Species Name	Height (m)	Cover (%)
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GQ38
Described by: MS Date: 17/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 675167 mE, 7094717 mN

Landform: Outcrop
Slope: Moderately inclined (5-15°)

Soils
Soil Texture: Clay loam
Soil Colour: Brown
Rock Type: Calcrete, Granite

Coarse Surface Particles
Site Coverage: 10-20%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 2%
Litter: 0.1%
Perennial Ground Cover: 18%

Vegetation: *Corymbia ferriticola* and *Acacia fuscaneura* low open woodland over *Dodonaea pachyneura* mid sparse shrubland over *Dysphania saxatilis* low sparse forbland with Cymbopogon ambiguus sparse tussock grassland

Condition: Very Good **Fire Age:** Unknown **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia fuscaneura	2	2
Aristida contorta	0.1	0.1
Corymbia ferriticola	3	2
Cymbopogon ambiguus	0.5	0.1
Dodonaea pachyneura	1.6	2
Dysphania saxatilis	0.1	0.1
Enchylaena tomentosa var. *tomentosa*	0.3	0.1
Eragrostis sp.	0.3	0.1
Eremophila latrobei	0.6	0.1
Eriachne mucronata	0.2	0.1
Eriachne pulchella subsp. *pulchella*	0.1	0.1
Sida ?cardiophylla	0.1	0.1
Solanum cleistogamum	0.1	0.1
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GQ39
Described by: SF Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 673859 mE, 7095465 mN

Landform: Drainage Line
Slope: Level (0-3°)

Soils
Soil Texture: Clayey sand
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 85%
Litter: 10%
Perennial Ground Cover: 35%

Vegetation: *Acacia mulganeura*, *Acacia ?paraneura* and *Acacia ?pteraneura* low open woodland over *Acacia tetragonophylla* mid open shrubland over *Eremophila glutinosa* low sparse shrubland with *Aristida holathera* var. *holathera* sparse tussock grassland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing, Feral scats, Feral trampling

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	8	3
Acacia ? pteraneura	3	10
Acacia mulganeura	6	15
Acacia tetragonophylla	2	1
Aristida holathera var. *holathera*	0.6	0.5
Eremophila glutinosa	0.5	0.1
Eremophila macmillaniana	0.5	0.1
Hakea lorea subsp. *lorea*	4	3
Psydrax rigidula	0.3	0.1
Ptilotus obovatus	0.5	1
Senna artemisioides subsp. *helmsii*	1.2	0.1
Sida fibulifera	0.1	0.1
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GQ40

Described by: MS Date: 15/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 673851 mE, 7095208 mN

Landform: Broad drainage
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Brown
Rock Type: Granite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-20 mm
Outcropping: No

Ground Cover
Bare Soil: 20%
Litter: 20%
Perennial Ground Cover: 55%

Vegetation: *Acacia ?paraneura* and *Acacia ?pteraneura* low woodland over *Acacia ?paraneura*, *Eremophila fraseri* subsp. *fraseri* and *Senna artemisioides* subsp. *helmsii* mid open shrubland over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Abutilon cryptopetalum	0.1	0.1
Acacia ? paraneura	4	30
Acacia ? pteraneura	3	5
Acacia tetragonophylla	1.6	0.1
Acacia wanyu	0.5	0.1
Cheilanthes sieberi subsp. *sieberi*	0.1	0.1
Dodonaea pachyneura	2	0.5
Enchylaena tomentosa var. *tomentosa*	0.2	0.1
Eremophila flabellata	0.2	0.1
Eremophila fraseri subsp. *fraseri*	2	2
Eremophila glutinosa	0.6	0.1
Harnieria kempeana subsp. *muelleri*	0.4	0.1
Maireana villosa	0.1	0.1
Marsdenia australis	0.1	0.1
Psydrax suaveolens	0.5	0.1
Ptilotus obovatus	0.3	0.1

Species Name	Height (m)	Cover (%)
Rhagodia drummondii	0.2	0.1
Sclerolaena cuneata	0.1	0.1
Senna artemisioides subsp. *helmsii*	1.2	0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ41
Described by: MS Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 674370 mE, 7095087 mN

Landform: Outcrop
Slope: Gently inclined (3-5°)

Soils
Soil Texture: Clay loam
Soil Colour: Light brown
Rock Type: Calcrete, Granite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 5%
Litter: 1%
Perennial Ground Cover: 25%

Vegetation: *Corymbia ferriticola* isolated trees over *Acacia grasbyi*, *Acacia fuscaneura*, Acacia ramulosa var. linophylla and Acacia cockertoniana mid open shrubland over *Eremophila latrobei*, *Eremophila glutinosa*, *Ptilotus schwartzii* and *Dodonaea pachyneura* mid to low sparse shrubland

Condition: Very Good **Fire Age:** Unknown **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia cockertoniana	2	1
Acacia fuscaneura	2	1
Acacia grasbyi	2	25
Acacia ramulosa var. *linophylla*	0.5	0.1
Aristida contorta	0.1	0.1
Corymbia ferriticola	1.6	0.1
Cymbopogon ambiguus	0.2	0.1
Dodonaea pachyneura	1.6	1
Eremophila glutinosa	0.3	1
Eremophila latrobei	1.4	0.1
Monachather paradoxus	0.2	0.1
Neurachne minor	0.1	0.1
Ptilotus obovatus	0.1	0.1
Ptilotus schwartzii	0.3	0.1
Sclerolaena densiflora	0.1	0.1
Sida ?cardiophylla	0.1	0.1

Gnaweeda – GQ42

Described by: MS & SF Date: 15/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 673186 mE, 7095676 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand over clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 20%
Litter: 1%
Perennial Ground Cover: 15%

Vegetation: *Acacia ?paraneura* low open woodland over *Eremophila fraseri* subsp. *fraseri*, *Eremophila macmillaniana* and mixed Senna species mid sparse shrubland over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	5
Acacia fuscaneura	0.3	0.1
Acacia tetragonophylla	0.3	0.1
Aristida contorta	0.1	5
Enteropogon ramosus	0.2	0.1
Eremophila fraseri subsp. *fraseri*	1.4	2
Eremophila macmillaniana	1.5	1
Hakea preissii		
Maireana carnosa	0.1	0.1
Ptilotus obovatus	0.3	0.1
Sclerolaena densiflora	0.1	0.1
Senna glaucifolia	1.2	1
Senna sp. *Meekatharra* (E. Bailey 1-26)	1.2	0.1
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GQ43

Described by: MS Date: 15/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 671604 mE, 7096039 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange
Rock Type: Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 40%
Litter: 0.1%
Perennial Ground Cover: 30%

Vegetation: *Acacia ?pteraneura* and Grevillea striata tall sparse shrubland over *Eremophila macmillaniana* mid open shrubland over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	3	1
Acacia tetragonophylla		Outside
Aristida contorta	0.1	0.1
Eremophila macmillaniana	1.5	20
Eremophila phyllopoda subsp. *phyllopoda*		Outside
Eremophila spathulata	0.8	0.1
Grevillea striata		Outside
Maireana melanocoma		Outside
Ptilotus obovatus	0.2	0.1
Ptilotus roei	0.1	0.1
Sclerolaena densiflora	0.1	0.1
Senna artemisioides subsp. *helmsii*	1.2	0.1
Senna glaucifolia	1.1	0.5
Senna sp. *Meekatharra* (E. Bailey 1-26)		Outside
Solanum lasiophyllum	0.2	0.1
Stenopetalum anfractum	0.2	0.1

Gnaweeda – GQ44

Described by: MS Date: 15/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 672491 mE, 7095847 mN

Landform: Low stony ridge
Slope: Gently inclined (3-5°)

Soils
Soil Texture: Clay loam
Soil Colour: Orange/brown
Rock Type: Granite

Coarse Surface Particles
Site Coverage: >90%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 1%
Litter: 1%
Perennial Ground Cover: 25%

Vegetation: *Acacia ?paraneura* low sparse shrubland over *Acacia grasbyi* mid sparse shrubland over *Senna* sp. Meekatharra (E. Bailey 1-26) and *Eremophila macmillaniana* low open shrubland

Condition: Very Good **Fire Age:** 5-15 years **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	2	1
Acacia grasbyi	1.8	5
Atriplex codonocarpa	0.1	0.1
Eremophila glutinosa	0.3	0.1
Eremophila macmillaniana	1	5
Maireana melanocoma	0.2	0.1
Ptilotus nobilis	0.2	0.1
Ptilotus obovatus	0.4	0.1
Scaevola spinescens	1.1	1
Sclerolaena densiflora	0.1	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *filifolia*	0.5	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	1.2	15
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ45
Described by: MS & SF Date: 15/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 670135 mE, 7096346 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-600 mm
Outcropping: No

Ground Cover
Bare Soil: 30%
Litter: 2%
Perennial Ground Cover: 25%

Vegetation: *Acacia ?inaequilatera* and *Acacia pruinocarpa* low open woodland over *Acacia tetragonophylla* and *Acacia grasbyi* tall to mid sparse shrubland over *Eremophila spathulata*, *Eremophila macmillaniana* and *Ptilotus rotundifolius* mid to low sparse shrubland over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura		Outside
Acacia fuscaneura	3	2
Acacia grasbyi		Outside
Acacia mulganeura		Outside
Acacia pruinocarpa	4	2
Acacia tetragonophylla	3	2
Aristida contorta		Outside
Cheilanthes sieberi subsp. *sieberi*	0.1	0.1
Dysphania melanocarpa forma melanocarpa	0.1	0.1
Eremophila glutinosa		Outside
Eremophila latrobei	0.6	0.1
Eremophila macmillaniana	0.7	1
Eremophila spathulata	0.7	2
Eriachne sp.	0.1	0.1
Hakea preissii	0.1	0.1

Species Name	Height (m)	Cover (%)
Hibiscus sturtii var. *truncatus*	0.2	0.1
Maireana tomentosa		Outside
Psydrax latifolia		Outside
Ptilotus obovatus	0.6	0.1
Ptilotus roei	0.1	0.1
Ptilotus rotundifolius	0.3	0.1
Ptilotus schwartzii		Outside
Rhagodia drummondii	0.5	0.1
Sclerolaena densiflora	0.1	0.1
Senna artemisioides subsp. *helmsii*		Outside
Sida sp. *dark green fruits* (S. van Leeuwen 2260)	0.5	0.1
Solanum lasiophyllum	0.3	0.1
Spartothamnella teucriiflora	0.6	0.1

Gnaweeda – GQ46
Described by: MS & SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676733 mE, 7085093 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand with patches of medium clay
Soil Colour: Orange
Rock Type: N/A

Coarse Surface Particles
Site Coverage: 0%
Size: N/A
Outcropping: No

Ground Cover
Bare Soil: 40%
Litter: 7%
Perennial Ground Cover: 40%

Vegetation: *Acacia ?paraneura* low woodland over *Eremophila forrestii* mid open shrubland over *Eragrostis eriopoda* open tussock grassland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	4	20
Eragrostis eriopoda	0.5	10
Eremophila forrestii	1.7	20
Eremophila latrobei	0.6	0.1
Eremophila spectabilis subsp. *spectabilis*	0.6	0.1
Erodium sp.	0.1	0.1
Marsdenia australis	0.1	0.1
Monachather paradoxus	0.3	0.1
Psydrax rigidula	0.5	0.1
Ptilotus obovatus	1.5	1
Rhagodia drummondii	1.2	0.1
Scaevola spinescens	0.2	0.1
Senna artemisioides subsp. *x sturtii*	0.8	1
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GQ47
Described by: MS Date: 17/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676839 mE, 7090258 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange
Rock Type: Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 45%
Litter: 5%
Perennial Ground Cover: 15%

Vegetation: *Acacia ?paraneura* and *Grevillea berryana* low open woodland over *Psydrax rigidula* mid sparse shrubland over *Ptilotus schwartzii* low sparse shrubland with *Eragrostis eriopoda* and other dead mixed grasses tussock grassland

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	10
Acacia ? pteraneura		Outside
Acacia cockertoniana		Outside
Acacia mulganeura		outside
Acacia pruinocarpa		Outside
Acacia tetragonophylla	1.5	0.1
Eragrostis eriopoda	0.2	0.1
Eremophila compacta subsp. *compacta*	0.3	0.1
Eremophila fraseri subsp. *fraseri*		Outside
Eremophila glutinosa		Outside
Eremophila latrobei	0.6	0.1
Goodenia tenuiloba	0.1	0.1
Grevillea berryana	4	5
Hibiscus sp.	0.2	0.1
Monachather paradoxus	0.2	0.1
Poaceae sp.	0.1	0.1

Species Name	Height (m)	Cover (%)
Psydrax latifolia	0.6	0.1
Psydrax rigidula	3	1
Ptilotus schwartzii	0.3	0.1
Solanum lasiophyllum	0.4	0.1

Gnaweeda – GQ48
Described by: MS & SF Date: 13/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 679931 mE, 7089119 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Clay loam
Soil Colour: Brown
Rock Type: Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 20%
Litter: 0.5%
Perennial Ground Cover: 15%

Vegetation: (*Acacia ?paraneura* low open woodland over) *Eremophila fraseri* subsp. *fraseri* mid to low sparse shrubland over *Ptilotus obovatus* low sparse shrubland over *Sclerolaena cuneata* and *Sclerolaena densiflora* sparse dwarf chenopod shrubland

General Notes: Most of the vegetation recorded within this Quadrat (20 x 20m) is dead.

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Cratystylis subspinescens	1.2	0.1
Duperreya commixta	0.1	0.1
Eremophila fraseri subsp. *fraseri*	1.8	7
Eremophila macmillaniana	0.6	1
Ptilotus obovatus	0.4	4
Ptilotus roei	0.1	0.1
Ptilotus schwartzii	0.2	0.1
Sclerolaena cuneata	0.1	0.1
Sclerolaena densiflora	0.1	0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ49
Described by: SF Date: 14/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 679469 mE, 7086962 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Heavy clay
Soil Colour: Light orange/brown
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-20 mm
Outcropping: No

Ground Cover
Bare Soil: 98%
Litter: 1%
Perennial Ground Cover: 2%

Vegetation: *Acacia tetragonophylla* low open shrubland over *Ptilotus obovatus* and *Eremophila spectabilis* subsp. *spectabilis* low scattered shrubs over *Sclerolaena densiflora* sparse dwarf chenopod shrubland

General Notes: Presence of dead shrubs and grasses. Very dry claypan.

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	2	Outside
Acacia tetragonophylla	1.5	0.8
Eremophila fraseri subsp. *fraseri*	0.3	0.1
Eremophila spectabilis subsp. *spectabilis*	0.3	0.1
Maireana carnosa	0.05	0.1
Ptilotus obovatus	0.2	0.5
Sclerolaena densiflora	0.05	0.1

Gnaweeda – GQ50
Described by: MS & SF Date: 15/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 670591 mE, 7096365 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange
Rock Type: Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-600 mm
Outcropping: No

Ground Cover
Bare Soil: 5%
Litter: 0.1%
Perennial Ground Cover: 10%

Vegetation: *Acacia ?pteraneura*, *Acacia ?paraneura* and *Acacia pruinocarpa* low open woodland over *Eremophila spathulata*, *Eremophila macmillaniana* and *Ptilotus rotundifolius* mid sparse shrubland over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura		Outside
Acacia ? pteraneura	2.5	3
Acacia grasbyi		Outside
Acacia pruinocarpa		Outside
Acacia quadrimarginea	0.5	0.1
Acacia tetragonophylla		Outside
Amyema fitzgeraldii		Outside
Aristida contorta	0.1	0.1
Eremophila forrestii		Outside
Eremophila fraseri subsp. *fraseri*	1.4	0.1
Eremophila latrobei		Outside
Eremophila macmillaniana	0.1	0.1
Eremophila spathulata	1	2
Maireana tomentosa	0.4	0.1
Psydrax latifolia		Outside
Ptilotus obovatus	0.5	0.5

Species Name	Height (m)	Cover (%)
Ptilotus roei	0.1	0.1
Ptilotus rotundifolius	1.1	1
Rhagodia eremaea	0.2	0.1
Scaevola spinescens		Outside
Sclerolaena densiflora	0.1	0.1
Senna artemisioides subsp. *helmsii*		Outside
Senna sp.		Outside
Sida ectogama		Outside
Solanum lasiophyllum	0.1	0.1
Spartothamnella teucriiflora		Outside

Gnaweeda – GQ51
Described by: MS & SF Date: 15/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 670868 mE, 7096118 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 10%
Litter: 1%
Perennial Ground Cover: 12%

Vegetation: *Eremophila fraseri* subsp. *fraseri* mid sparse shrubland over *Eremophila spathulata*, *Eremophila macmillaniana* and *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia tetragonophylla		Outside
Aristida contorta	0.1	0.1
Eremophila fraseri subsp. *fraseri*	1.8	3
Eremophila macmillaniana	1.3	3
Erodium sp.	0.1	0.1
Euphorbia boophthona	0.2	0.1
Maireana carnosa	0.1	0.1
Psydrax rigidula	0.6	0.1
Ptilotus obovatus	0.8	1
Ptilotus roei	0.1	0.1
Ptilotus rotundifolius		Outside
Sclerolaena densiflora	0.1	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)		Outside
Solanum lasiophyllum	0.5	1
Stenopetalum anfractum	0.2	0.1

Gnaweeda – GQ52
Described by: SF Date: 15/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 672449 mE, 7095900 mN

Landform: Floodplain, Plain
Slope: Level (0-3°)

Soils
Soil Texture: Clayey sand
Soil Colour: Light brown
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: >90%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 2%
Litter: 0.1%
Perennial Ground Cover: 1%

Vegetation: *Senna* sp. Meekatharra (E. Bailey 1-26) mid open shrubland over *Enneapogon caerulescens* and *Aristida contorta* sparse tussock grassland over *Sclerolaena densiflora* sparse dwarf chenopod shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Feral trampling

Species List

Species Name	Height (m)	Cover (%)
Aristida contorta	0.05	0.1
Atriplex codonocarpa	0.05	0.1
Cynodon prostratus	0.05	0.1
Enneapogon caerulescens	0.05	0.1
Euphorbia drummondii	0.05	0.1
Gunniopsis propinqua	0.05	0.1
Maireana carnosa	0.05	0.1
Ptilotus nobilis	0.1	0.1
Ptilotus roei	0.05	0.1
Sclerolaena cuneata	0.1	0.1
Sclerolaena densiflora	0.05	0.5
Senna sp. Meekatharra (E. Bailey 1-26)	0.4	0.2

Gnaweeda – GQ53
Described by: MS & SF Date: 18/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676655 mE, 7089343 mN

Landform: Claypan plain
Slope: Level (0-3°)

Soils
Soil Texture: Heavy clay
Soil Colour: Brown
Rock Type: Basalt, Granite, Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-20 mm
Outcropping: No

Ground Cover
Bare Soil: 60%
Litter: 37%
Perennial Ground Cover: 3%

Vegetation: *Hakea lorea* subsp. *lorea*, *Acacia tetragonophylla* and *Acacia mulganeura* low to mid isolated trees over mixed dead tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Tracks

Species List

Species Name	Height (m)	Cover (%)
Acacia mulganeura	2	0.5
Acacia tetragonophylla	4.5	0.5
Eremophila fraseri subsp. *fraseri*	0.2	0.1
Hakea lorea subsp. *lorea*	4	1

Gnaweeda – GQ54
Described by: MS Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 673899 mE, 7095283 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Clay loam
Soil Colour: Yellow brown
Rock Type: Calcrete, Quartzite

Coarse Surface Particles
Site Coverage: 2-10%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 80%
Litter: 1%
Perennial Ground Cover: 25%

Vegetation: *Acacia ?pteraneura* low open woodland over *Senna artemisioides* subsp. x *artemisioides* mid sparse shrubland over *Sclerolaena densiflora* sparse dwarf chenopod shrubland with *Aristida contorta* sparse tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	3	2
Acacia aneura	2	1
Aristida contorta	0.1	0.1
Eremophila fraseri subsp. *fraseri*	2	1
Hakea preissii	0.2	0.1
Ptilotus obovatus	0.5	0.1
Sclerolaena densiflora	0.1	0.1
Senna artemisioides subsp. *x artemisioides*	1.6	5
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ55
Described by: SF Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 674889 mE, 7095133 mN

Landform: Outcrop, Ridge
Slope: Gently inclined (3-5°)

Soils
Soil Texture: Light clay
Soil Colour: Orange
Rock Type: Granite, Quartzite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-600 mm
Outcropping: No

Ground Cover
Bare Soil: 0.1%
Litter: 0.1%
Perennial Ground Cover: 20%

Vegetation: *Corymbia ferriticola* with *Acacia incurvaneura* low open woodland over *Eremophila glutinosa* low open shrubland over *Ptilotus schwartzii* low sparse shrubland

Condition: Very Good **Fire Age:** >15 years **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	1.1	0.1
Acacia incurvaneura	2.5	2
Corymbia ferriticola	2	5
Eremophila glutinosa	1.5	2
Eremophila latrobei	0.2	0.1
Maireana ? villosa	0.1	0.1
Ptilotus schwartzii	0.3	0.5
Stenopetalum anfractum	0.2	0.1

Gnaweeda – GQ56
Described by: MS Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 674161 mE, 7095199 mN

Landform: Outcrop
Slope: Gently inclined (3-5°)

Soils
Soil Texture: Clay loam
Soil Colour: Brown
Rock Type: Calcrete, Granite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 2%
Litter: 0.1%
Perennial Ground Cover: 10%

Vegetation: *Corymbia ferriticola* isolated trees over *Acacia grasbyi* mid sparse shrubland over *Thryptomene decussata*, *Dodonaea pachyneura* and *Ptilotus schwartzii* low sparse shrubland

Condition: Very Good **Fire Age:** Unknown **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia craspedocarpa	0.2	0.1
Acacia grasbyi	1.5	2
Aristida contorta	0.1	0.1
Corymbia ferriticola	1.2	1
Cymbopogon ambiguus	0.4	0.1
Dodonaea pachyneura	1.2	0.5
Eremophila flabellata	0.2	0.1
Eremophila glutinosa	0.6	0.1
Eremophila macmillaniana	0.3	0.1
Grevillea deflexa	0.5	0.1
Maireana melanocoma	0.2	0.1
Ptilotus schwartzii	0.3	0.1
Sclerolaena diacantha	0.1	0.1
Solanum lasiophyllum	0.2	0.1
Stackhousia sp.	0.3	0.1
Stylidium longibracteatum	0.1	0.1
Thryptomene decussata	0.5	1

Gnaweeda – GQ57
Described by: SF Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 674302 mE, 7095240 mN

Landform: Outcrop
Slope: Moderately inclined (5-15°)

Soils
Soil Texture: Clayey sand
Soil Colour: Orange
Rock Type: Granite, Quartzite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-2000 mm
Outcropping: No

Ground Cover
Bare Soil: 6%
Litter: 0.1%
Perennial Ground Cover: 30%

Vegetation: *Corymbia ferriticola* low open woodland over *Acacia fuscaneura* and *Acacia ?paraneura* low sparse shrubland over *Eremophila glutinosa* low sparse shrubland

Condition: Very Good **Fire Age:** >15 years **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	2.2	2
Acacia fuscaneura	2.2	5
Acacia grasbyi	1.5	6
Corymbia ferriticola	3	4
Eremophila glutinosa	1	2
Eremophila latrobei	1	0.1
Ptilotus schwartzii	0.2	0.1
Senna artemisioides subsp. *helmsii*	0.2	0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ58
Described by: MS Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 675052 mE, 7094869 mN

Landform: Outcrop
Slope: Moderately inclined (5-15°)

Soils
Soil Texture: Clay loam
Soil Colour: Brown
Rock Type: Calcrete, Granite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-600 mm
Outcropping: No

Ground Cover
Bare Soil: 0.1%
Litter: 0.1%
Perennial Ground Cover: 25%

Vegetation: *Corymbia ferriticola* and *Acacia fuscaneura* low woodland over *Dodonaea pachyneura* and *Eremophila latrobei* low sparse shrubland

Condition: Very Good Good **Fire Age:** Unknown **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia fuscaneura	2	20
Acacia grasbyi	1.2	1
Corymbia ferriticola	2	1
Cymbopogon ambiguus	0.2	0.1
Dodonaea pachyneura	1.5	0.1
Eragrostis sp.	0.4	0.1
Eremophila flabellata	0.3	0.1
Eremophila glutinosa	1.2	0.1
Eremophila latrobei	0.5	0.1
Eriachne pulchella subsp. *pulchella*	0.1	0.1
Keraudrenia velutina	0.6	0.1
Sida ?cardiophylla	0.2	1
Solanum cleistogamum	0.1	0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GQ59

Described by: SF Date: 16/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 675162 mE, 7095078 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Basalt, Granite, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-600 mm
Outcropping: No

Ground Cover
Bare Soil: 70%
Litter: 0.5%
Perennial Ground Cover: 2%

Vegetation: *Acacia ?pteraneura* low isolated trees over *Eremophila macmillaniana* mid isolated shrubs over *Ptilotus obovatus* low sparse shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Feral trampling

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	0.5	0.5
Aristida contorta	0.05	0.1
Eremophila macmillaniana	0.5	0.5
Maireana carnosa	0.05	0.1
Ptilotus obovatus	0.3	1
Sclerolaena densiflora	0.05	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	0.5	0.1
Solanum lasiophyllum	0.5	0.1

Gnaweeda – GQ60

Described by: MS Date: 17/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676462 mE, 7093820 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sand over medium clay
Soil Colour: Orange
Rock Type: Dolerite, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 40%
Litter: 2%
Perennial Ground Cover: 20%

Vegetation: *Acacia pruinocarpa* and *Acacia ?paraneura* low open woodland over *Eremophila spathulata*, *Senna* sp. Meekatharra (E. Bailey 1-26) and *Senna artemisioides* subsp. *helmsii* mid sparse shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	3
Acacia ? pteraneura		Outside
Acacia kempeana		Outside
Acacia pruinocarpa	3	2
Acacia sp.		Outside
Aristida contorta	0.1	0.1
Eremophila glutinosa	0.6	0.1
Eremophila latrobei	1.2	0.1
Eremophila spathulata	1.5	1
Grevillea berryana		Outside
Hibiscus sturtii var. *truncatus*	0.2	0.1
Monachather paradoxus	0.1	0.1
Psydrax latifolia		Outside
Psydrax rigidula	1.2	0.1
Ptilotus obovatus		Outside
Ptilotus rotundifolius	1.2	0.1
Ptilotus schwartzii	0.3	0.1

Species Name	Height (m)	Cover (%)
Senna artemisioides subsp. *helmsii*	1.2	1
Senna glaucifolia	0.6	0.1
Solanum lasiophyllum	0.6	0.1

Gnaweeda – GQ61
Described by: MS & SF Date: 17/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 679579 mE, 7085549 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: 2-10%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 98%
Litter: 0.1%
Perennial Ground Cover: 2%

Vegetation: *Eremophila fraseri* subsp. *fraseri* mid isolated shrubs over *Ptilotus obovatus* low isolated shrubs over *Maireana carnosa* and *Sclerolaena densiflora* sparse dwarf chenopod shrubland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Feral scats, Feral trampling

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura		Outside
Acacia mulganeura		Outside
Acacia ramulosa var. *linophylla*		Outside
Acacia tetragonophylla	1.2	0.1
Aristida contorta	0.1	0.5
Dysphania saxatilis	0.1	0.1
Eremophila forrestii		Outside
Eremophila fraseri subsp. *fraseri*	1.6	1
Maireana carnosa	0.1	0.1
Ptilotus obovatus	0.5	0.25
Sclerolaena densiflora	0.1	0.1
Senna artemisioides subsp. *helmsii*		Outside
Sida sp.	0.1	0.1
Solanum lasiophyllum	0.1	0.1

Gnaweeda – GQ62
Described by: MS & SF Date: 18/10/2016 Type: Quadrat (20 x 20m)
GPS Co-ordinate: 50J 676834 mE, 7089604 mN

Landform: Claypan plain
Slope: Level (0-3°)

Soils
Soil Texture: Heavy clay
Soil Colour: Brown
Rock Type: Basalt, Granite, Ironstone, Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 5%
Litter: 92%
Perennial Ground Cover: 3%

Vegetation: *Acacia tetragonophylla* and *Acacia ?pteraneura* tall sparse shrubland over mixed dead tussock grassland

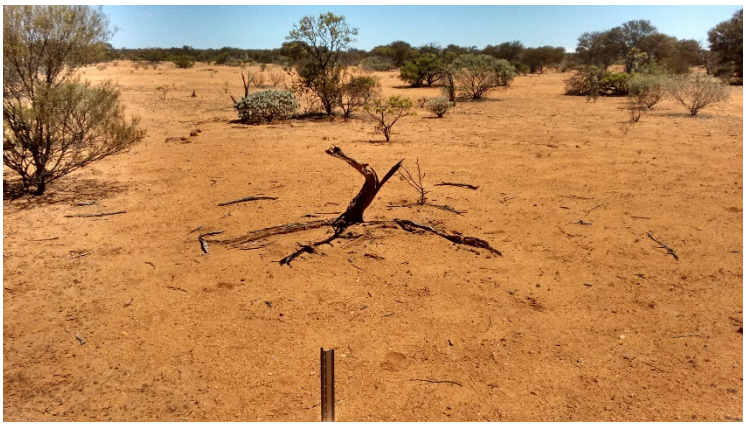
Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing, Feral scats, Tracks

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	3.5	2
Acacia mulganeura		Outside
Acacia tetragonophylla	4	1
Eragrostis dielsii	0.1	0.1
Eremophila fraseri subsp. *fraseri*		Outside
Eriachne ? ovata	0.1	0.1

Gnaweeda – GQFF01

Described by: SF Date: 22/11/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 673904 mE, 7095398 mN



Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sandy loam
Soil Colour: Brown
Rock Type: Granite, Quartzite

Coarse Surface Particles
Site Coverage: 10-20%
Size: 6-60 mm
Outcropping: 2-10%

Ground Cover
Bare Soil: 95%
Litter: 2%
Perennial Ground Cover: 10%

Vegetation: *Acacia ?pteraneura* low open woodland over *Senna* sp. Meekatharra (E. Bailey 1-26), *Senna artemisioides* subsp. x *artemisioides* and *Eremophila fraseri* subsp. *fraseri* low open shrubland

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing, Feral scats

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	3	5
Acacia kempeana	0.3	0.1
Eremophila fraseri	1.2	2
Eremophila granitica	0.5	0.1
Eremophila spectabilis subsp. *spectabilis*	1	0.5
Maireana georgei	0.2	0.1
Sclerolaena densiflora	0.1	0.1
Senna artemisioides subsp. *x artemisioides*	1	0.5
Senna sp. *Meekatharra* (E. Bailey 1-26)	1.5	2
Senna sp. *Senna* sp. *Meekatharra* (E. Bailey 1-26) *hybrid*	1	41

Gnaweeda – GR01

Described by: MS Date: 15/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 672711 mE, 7095633 mN

Landform: Outcrop
Slope: Moderately inclined (5-15°)

Soils
Soil Texture: Clay loam
Soil Colour: Orange brown
Rock Type: Granite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 0%
Litter: 1%
Perennial Ground Cover: 15%

Vegetation: *Corymbia ferriticola* and *Acacia fuscaneura* low open woodland over *Dodonaea pachyneura* mid sparse shrubland over *Eriachne mucronata* sparse tussock grassland

Condition: Very Good **Fire Age:** 5-15 years **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia fuscaneura	3	5
Acacia grasbyi	2.5	0.1
Acacia pruinocarpa	0.1	0.1
Corymbia ferriticola	3.5	1
Cymbopogon ambiguus	0.3	0.1
Dodonaea pachyneura	1.2	5
Dysphania saxatilis	0.1	0.1
Enchylaena tomentosa var. *tomentosa*	1.2	0.1
Eremophila latrobei	1.8	1
Eremophila macmillaniana	1.2	0.1
Eremophila oppositifolia subsp. *angustifolia*		Outside
Eriachne mucronata	0.2	5
Eriachne pulchella subsp. *pulchella*	0.1	0.1
Lepidium pholidogynum	0.1	0.1
Ptilotus obovatus	0.3	0.1
Solanum lasiophyllum	0.2	0.1

Gnaweeda – GR02

Described by: SF Date: 15/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 672701 mE, 7095908 mN

Landform: Plain
Slope: Gently inclined (3-5°)

Soils
Soil Texture: Clayey sand
Soil Colour: Orange
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: >90%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 1%
Litter: 0.1%
Perennial Ground Cover: 1.5%

Vegetation: *Senna* sp. Meekatharra (E. Bailey 1-26) mid open shrubland over *Ptilotus obovatus* low open shrubland over *Sclerolaena densiflora* open dwarf chenopod shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Maireana carnosa	0.1	0.1
Maireana georgei	0.1	0.1
Maireana melanocoma	0.1	0.1
Ptilotus nobilis	0.2	0.1
Ptilotus obovatus	0.2	0.1
Sclerolaena cuneata	0.05	0.1
Sclerolaena densiflora	0.05	1
Senna artemisioides subsp. *x artemisioides*	0.2	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	0.5	0.5

Gnaweeda – GR03

Described by: SF Date: 15/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 627230 mE, 7095881 mN

Landform: Outcrop, Ridge
Slope: Gently inclined (3-5°)

Soils
Soil Texture: Sandy loam
Soil Colour: Orange
Rock Type: Granite, Quartzite

Coarse Surface Particles
Site Coverage: >90%
Size: 2-600 mm
Outcropping: No

Ground Cover
Bare Soil: 6%
Litter: 0.1%
Perennial Ground Cover: 4%

Vegetation: *Acacia ?paraneura* and *Acacia incurvaneura* low open woodland over *Eremophila spathulata* and *Thryptomene decussata* low open shrubland over *Ptilotus obovatus* low sparse shrubland

Condition: Very Good **Fire Age:** >15 years **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	1.5	2
Acacia incurvaneura	2.2	1.5
Cymbopogon ambiguus	0.2	0.1
Eremophila macmillaniana	1	0.5
Eremophila spathulata	0.5	2
Ptilotus obovatus	0.4	0.5
Senna sp. *Meekatharra* (E. Bailey 1-26)	1	0.5
Sida ectogama	0.5	0.1
Solanum lasiophyllum	0.1	0.1
Thryptomene decussata	0.6	1

Gnaweeda – GR04

Described by: MS & SF Date: 15/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 672662 mE, 7095581 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sandy clay
Soil Colour: Orange
Rock Type: Granite, Quartzite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 80%
Litter: 2%
Perennial Ground Cover: 20%

Vegetation: *Acacia ?paraneura* low open woodland over *Senna artemisioides* subsp. *helmsii* mid open shrubland

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	4	10
Acacia craspedocarpa	1.4	0.1
Acacia fuscaneura	0.5	0.1
Acacia grasbyi	1.5	0.1
Acacia wanyu	1.2	0.1
Aristida contorta	0.1	0.1
Eremophila glutinosa	1.4	0.1
Eremophila macmillaniana	1.2	1
Ptilotus obovatus	0.2	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *helmsii*	1.4	10
Senna glutinosa subsp. *x luerssenii*	1.6	0.1
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GR05

Described by: SF Date: 15/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 673103 mE, 7095765 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-6 mm
Outcropping: No

Ground Cover
Bare Soil: 49%
Litter: 0.1%
Perennial Ground Cover: 0.1%

Vegetation: *Maireana carnosa* and *Sclerolaena densiflora* sparse dwarf chenopod shrubland with *Aristida contorta* sparse tussock grassland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing, Feral scats, Feral trampling

Species List

Species Name	Height (m)	Cover (%)
Aristida contorta	0.05	0.1
Eremophila fraseri subsp. *fraseri*	0.2	0.1
Eremophila macmillaniana	0.5	0.1
Gunniopsis propinqua	0.05	0.1
Maireana carnosa	0.05	0.1
Ptilotus obovatus	0.2	0.1
Sclerolaena densiflora	0.5	0.1
Zygophyllum sp.	0.05	0.1

Gnaweeda – GR06
Described by: SF Date: 15/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 673526 mE, 7095670 mN

Landform: Crest, Outcrop, Ridge
Slope: Moderately inclined (5-15°)

Soils
Soil Texture: Medium clay
Soil Colour: Orange
Rock Type: Basalt, Granite, Quartzite

Coarse Surface Particles
Site Coverage: 10-20%
Size: 2-600 mm
Outcropping: No

Ground Cover
Bare Soil: 1%
Litter: 0.1%
Perennial Ground Cover: 5%

Vegetation: *Eucalyptus/Corymbia* sp. and *Acacia ?paraneura* low isolated trees over *Thryptomene decussata*, *Dodonaea pachyneura* and *Eremophila latrobei* mid sparse shrubland

Condition: Very Good **Fire Age:** >15 years **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? incurvaneura	0.6	0.5
Acacia ? pteraneura	0.5	0.5
Acacia grasbyi	1.2	0.1
Aristida contorta	0.1	0.1
Cymbopogon ambiguus	0.1	0.1
Dodonaea pachyneura	1.1	0.1
Dysphania saxatilis	0.1	0.1
Eremophila flabellata	0.2	0.5
Eremophila latrobei	1	1
Eucalyptus/Corymbia sp.	1	1
Hakea preissii	0.4	0.1
Hibiscus sp. *Gardneri* (A.L. Payne PRP 1435)	0.1	0.1
Neurachne minor	0.1	0.1
Ptilotus obovatus	0.3	0.2
Ptilotus schwartzii	0.2	0.1
Solanum lasiophyllum	0.2	0.1

Species Name	Height (m)	Cover (%)
Stenanthemum mediale	0.3	0.2
Stenopetalum anfractum	.4	0.5
Stylidium longibracteatum	0.1	0.1
Thryptomene decussata	1	1

Gnaweeda – GR07

Described by: MS Date: 15/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 672856 mE, 7095471 mN

Landform: Outcrop
Slope: Moderately inclined (5-15°)

Soils
Soil Texture: Sand
Soil Colour: Brown
Rock Type: Calcrete

Coarse Surface Particles
Site Coverage: >90%
Size: 2-2000 mm
Outcropping: No

Ground Cover
Bare Soil: 10%
Litter: 0.1%
Perennial Ground Cover: 40%

Vegetation: *Acacia ?paraneura* low open woodland over *Acacia grasbyi* mid sparse shrubland over *Ptilotus obovatus* low open shrubland

Condition: Very Good **Fire Age:** Unknown **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	3	1
Acacia grasbyi	2	5
Atriplex codonocarpa	0.1	0.1
Dodonaea pachyneura	1.8	0.1
Eremophila glutinosa	0.7	0.1
Eremophila latrobei	1.6	0.1
Eremophila oppositifolia subsp. *angustifolia*	1.6	0.1
Eriachne mucronata	0.3	0.1
Psydrax rigidula	1.6	0.1
Ptilotus obovatus	0.3	20
Sclerolaena diacantha	0.1	0.1

Gnaweeda – GR08
Described by: SF Date: 16/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 675216 mE, 7094898 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Sandy loam
Soil Colour: Orange
Rock Type: Basalt, Granite, Quartzite

Coarse Surface Particles
Site Coverage: 10-20%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 75%
Litter: 2%
Perennial Ground Cover: 25%

Vegetation: *Acacia ?pteraneura* and *Acacia grasbyi* low open woodland over *Eremophila macmillaniana* and *Senna artemisioides* subsp. x *artemisioides* low open shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing, Feral scats, Feral trampling

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	3	1
Acacia ? pteraneura	2.5	1
Acacia grasbyi	2	1
Acacia tetragonophylla	0.5	0.1
Acacia wanyu	1.8	0.5
Aristida contorta	0.1	0.1
Atriplex codonocarpa	0.2	0.1
Dodonaea pachyneura	1.3	0.1
Eremophila flabellata	0.2	0.1
Eremophila fraseri subsp. *fraseri*	1.2	0.5
Eremophila granitica	0.3	0.1
Eremophila macmillaniana	1.2	1
Eremophila spathulata	0.5	0.1
Maireana georgei	0.2	0.1
Ptilotus obovatus	0.2	0.5
Senna artemisioides subsp. *helmsii*	1.5	0.5
Senna artemisioides subsp. *x artemisioides*	1	0.5

Species Name	Height (m)	Cover (%)
Solanum lachnophyllum	0.5	0.1

Gnaweeda – GR09

Described by: SF Date: 16/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 675088 mE, 7095099 mN

Landform: Base of ridge
Slope: Level (0-3°)

Soils
Soil Texture: Medium clay with sand patches and crusting
Soil Colour: Light orange/brown
Rock Type: Quartzite

Coarse Surface Particles
Site Coverage: <2%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 15%
Litter: 50%
Perennial Ground Cover: 70%

Vegetation: *Acacia fuscaneura* and *Acacia ?paraneura* low closed woodland over *Eremophila macmillaniana*, *Dodonaea pachyneura* and *Ptilotus obovatus* mid to low open shrubland

Condition: Good **Fire Age:** >15 years **Disturbance:** Grazing, Feral scats, Feral trampling

Species List

Species Name	Height (m)	Cover (%)
Acacia ? paraneura	6	30
Acacia fuscaneura	6	30
Acacia grasbyi	2.5	0.5
Dodonaea pachyneura	2	2
Eremophila flabellata	0.2	0.1
Eremophila latrobei	0.7	0.1
Eremophila macmillaniana	1.2	5
Psydrax latifolia	1.4	0.1
Psydrax rigidula	0.3	0.1
Ptilotus obovatus	1.1	1
Senna sp. *Meekatharra* (E. Bailey 1-26)	1.1	0.1
Sida ectogama	1.3	4
Solanum lasiophyllum	0.1	0.1

Gnaweeda – GR10

Described by: SF Date: 16/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 675080 mE, 7095154 mN

Landform: Outcrop, Ridge
Slope: Moderately inclined (5-15°)

Soils
Soil Texture: Rock
Soil Colour: Brown
Rock Type: Basalt, Granite, Quartzite, Shale

Coarse Surface Particles
Site Coverage: >90%
Size: 2-2000 mm
Outcropping: No

Ground Cover
Bare Soil: 0.1%
Litter: 0.1%
Perennial Ground Cover: 5%

Vegetation: Eremophila oppositifolia subsp. angustifolia and *Senna* sp. Meekatharra (E. Bailey 1-26) mid sparse shrubland

Condition: Very Good **Fire Age:** >15 years **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Aristida contorta	0.05	0.1
Dysphania saxatilis	0.1	0.1
Eremophila macmillaniana	0.6	0.1
Eremophila oppositifolia subsp. *angustifolia*	1.5	1
Eriachne pulchella subsp. *pulchella*	0.05	0.1
Maireana melanocoma	0.2	0.1
Ptilotus obovatus	0.4	0.1
Sclerolaena densiflora	0.05	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	1	0.5

Gnaweeda – GR11

Described by: MS Date: 16/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 674096 mE, 7095219 mN

Landform: Outcrop
Slope: Gently inclined (3-5°)

Soils
Soil Texture: Clay loam
Soil Colour: Brown
Rock Type: Calcrete, Granite

Coarse Surface Particles
Site Coverage: 50-90%
Size: 2-200 mm
Outcropping: No

Ground Cover
Bare Soil: 2%
Litter: 2%
Perennial Ground Cover: 30%

Vegetation: *Corymbia ferriticola* and *Acacia ?pteraneura* low open woodland over *Acacia grasbyi* mid sparse shrubland over *Eremophila macmillaniana* and *Senna* sp. Meekatharra (E. Bailey 1-26) low sparse shrubland

Condition: Very Good **Fire Age:** Unknown **Disturbance:** Minor grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	3	2
Acacia grasbyi	2	2
Aristida contorta	0.1	0.1
Corymbia ferriticola	2	1
Dodonaea pachyneura	1.6	0.1
Eremophila flabellata	0.3	0.1
Eremophila glutinosa	1.2	0.1
Eremophila macmillaniana	1.2	15
Eremophila oppositifolia subsp. *angustifolia*	2	0.1
Lepidium sp.	0.3	0.1
Maireana melanocoma	0.2	0.1
Ptilotus nobilis	0.3	0.1
Sclerolaena diacantha	0.1	0.1
Senna artemisioides subsp. *x artemisioides*	1.8	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	1.2	2
Solanum lasiophyllum	0.3	0.1

Gnaweeda – GR12

Described by: MS Date: 17/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 675305 mE, 7094923 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Clay loam
Soil Colour: Orange
Rock Type: N/A

Coarse Surface Particles
Site Coverage: 0%
Size: N/A
Outcropping: No

Ground Cover
Bare Soil: 0.1%
Litter: 0.1%
Perennial Ground Cover: 10%

Vegetation: *Acacia ?pteraneura* low open woodland over *Senna* sp. Meekatharra (E. Bailey 1-26) and *Ptilotus obovatus* low open shrubland over *Aristida contorta* sparse tussock grassland

Condition: Good **Fire Age:** 5-15 years **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	2	1
Acacia fuscaneura	0.5	0.1
Acacia grasbyi	0.5	0.5
Acacia tetragonophylla	1.1	0.1
Acacia wanyu	1.2	0.5
Aristida contorta	0.1	1
Atriplex codonocarpa	0.1	0.1
Dodonaea pachyneura	1.2	0.1
Eremophila fraseri subsp. *fraseri*	1	0.1
Eremophila macmillaniana	1.3	1.5
Maireana carnosa	0.4	0.1
Ptilotus obovatus	0.6	2
Sclerolaena densiflora	0.1	0.1
Senna sp. *Meekatharra* (E. Bailey 1-26)	1	3
Solanum lasiophyllum	0.6	0.1

Gnaweeda – GR13
Described by: MS & SF Date: 18/10/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 678848 mE, 7089719 mN

Landform: Plain
Slope: Level (0-3°)

Soils
Soil Texture: Heavy clay
Soil Colour: Brown
Rock Type: Basalt, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 2-60 mm
Outcropping: No

Ground Cover
Bare Soil: 45%
Litter: 0.1%
Perennial Ground Cover: 3%

Vegetation: *Tecticornia ?disarticulata* low sparse chenopod shrubland over *Sclerolaena cuneata* sparse dwarf chenopod shrubland

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	3	0.1
Aristida contorta	0.1	0.1
Atriplex codonocarpa	0.1	0.1
Eremophila macmillaniana	1.2	0.1
Maireana carnosa	0.1	0.1
Maireana georgei	0.1	0.1
Ptilotus nobilis	0.1	0.1
Ptilotus obovatus	0.3	0.1
Ptilotus roei	0.1	0.1
Sclerolaena cuneata	0.1	0.1
Sclerolaena diacantha	0.1	1
Senna sp. *Meekatharra* (E. Bailey 1-26)	0.5	0.1
Solanum lasiophyllum	0.1	0.1
Streptoglossa sp.	0.1	0.1
Tecticornia ? auriculata	0.6	1

Gnaweeda – GRFF01

Described by: SF Date: 22/11/2016 Type: Relevé (~20 x 20m)
GPS Co-ordinate: 50J 675004 mE, 7094990 mN

Landform: Plain
Slope: Gently inclined (3-5°)

Soils
Soil Texture: Clayey sand
Soil Colour: Brown
Rock Type: Granite, Quartzite

Coarse Surface Particles
Site Coverage: 20-50%
Size: 6-200 mm
Outcropping: 2-10%

Ground Cover
Bare Soil: 70%
Litter: 2%
Perennial Ground Cover: 20%

Vegetation: *Acacia ?pteraneura*, *Acacia grasbyi*, and occasional *Acacia pruinocarpa* low open woodland over *Eremophila spectabilis*, *Senna* sp. Meekatharra (E. Bailey 1-26) and *Senna artemisioides* subsp. x *artemisioides* low open shrubland

Condition: Good **Fire Age:** Unknown **Disturbance:** Grazing

Species List

Species Name	Height (m)	Cover (%)
Acacia ? pteraneura	3	4
Acacia grasbyi	2	3
Acacia maitlandii	0.2	0.1
Acacia pruinocarpa	4	0.1
Eremophila flabellata	0.3	0.1
Eremophila fraseri subsp. *fraseri*	1.5	0.1
Eremophila oppositifolia	1.6	0.1
Eremophila spectabilis	1	1
Maireana melanocoma	0.2	0.1
Ptilotus obovatus	0.4	0.1
Senna artemisioides subsp. *x artemisioides*	0.5	5
Senna sp. Meekatharra (E. Bailey 1-26)	0.5	1
Solanum lasiophyllum	0.2	0.1

Appendix K Inventory of vascular flora taxa

Family	Taxon	Conservation Status
Acanthaceae	*Harnieria kempeana* subsp. *muelleri*	
Aizoaceae	*Gunniopsis propinqua*	P3
	Gunniopsis rodwayi	
Amaranthaceae	*Ptilotus nobilis*	
	Ptilotus obovatus	
	Ptilotus roei	
	Ptilotus rotundifolius	
	Ptilotus schwartzii	
Apocynaceae	*Marsdenia australis*	
Asteraceae	*Calocephalus multiflorus*	
	Chrysocephalum puteale	
	Cratystylis subspinescens	
	Gnephosis tenuissima	
	Streptoglossa sp.	
Brassicaceae	*Lepidium pholidogynum*	
	Lepidium platypetalum	
	Lepidium sp.	
	Stenopetalum anfractum	
Celastraceae	*Stackhousia* sp.	
Chenopodiaceae	*Atriplex codonocarpa*	
	Dysphania melanocarpa forma *melanocarpa*	
	Dysphania rhadinostachya	
	Dysphania saxatilis	
	Enchylaena tomentosa var. *tomentosa*	
	Maireana ? villosa	
	Maireana carnosa	
	Maireana georgei	
	Maireana melanocoma	
	Maireana sp.	
	Maireana tomentosa subsp. *tomentosa*	
	Maireana villosa	
	Rhagodia drummondii	
	Rhagodia eremaea	
	Sclerolaena cuneata	
	Sclerolaena densiflora	
	Sclerolaena diacantha	
	Sclerolaena eriacantha	
	Sclerolaena tetragona	
	Tecticornia ? auriculata	
Convolvulaceae	*Duperreya commixta*	
Euphorbiaceae	*Euphorbia boophthona*	
	Euphorbia drummondii	
Fabaceae	*Acacia ? incurvaneura*	
	Acacia ? paraneura	
	Acacia ? pteraneura	
	Acacia aneura	
	Acacia caesaneura	

Family	Taxon	Conservation Status
	Acacia cockertoniana	
	Acacia craspedocarpa	
	Acacia fuscaneura	
	Acacia grasbyi	
	Acacia incurvaneura	
	Acacia incurvaneura x mulganeura	
	Acacia kempeana	
	Acacia maitlandii	
	Acacia minyura	
	Acacia mulganeura	
	Acacia pruinocarpa	
	Acacia quadrimarginea	
	Acacia ramulosa var. *linophylla*	
	Acacia ramulosa var. *ramulosa*	
	Acacia sp.	
	Acacia tetragonophylla	
	Acacia wanyu	
	Mirbelia rhagodioides	
	Senna artemisioides subsp. *filifolia*	
	Senna artemisioides subsp. *helmsii*	
	Senna artemisioides subsp. *oligophylla x helmsii*	
	Senna artemisioides subsp. *x artemisioides*	
	Senna artemisioides subsp. *x sturtii*	
	Senna glaucifolia	
	Senna glaucifolia (hybrid)	
	Senna glutinosa subsp. *x luerssenii*	
	Senna sp.	
	Senna sp. Meekatharra (E. Bailey 1-26)	
Geraniaceae	*Erodium* sp.	
Goodeniaceae	*Goodenia ? tenuiloba*	
	Goodenia tenuiloba	
	Scaevola spinescens	
Lamiaceae	*Spartothamnella teucriiflora*	
Loranthaceae	*Amyema fitzgeraldii*	
Malvaceae	*Abutilon cryptopetalum*	
	Abutilon sp.	
	Hibiscus sp.	
	Hibiscus sp. Gardneri (A.L. Payne PRP 1435)	
	Hibiscus sturtii var. *truncatus*	
	Keraudrenia velutina	
	Sida ?cardiophylla	
	Sida ectogama	
	Sida fibulifera	
	Sida platycalyx	
	Sida sp.	
	Sida sp. dark green fruits (S. van Leeuwen 2260)	
Myrtaceae	*Aluta maisonneuvei* subsp. *auriculata*	
	Calytrix amethystina	
	Calytrix desolata	

Family	Taxon	Conservation Status
	Corymbia ferriticola	
	Homalocalyx staminous	
	Thryptomene decussata	
Poaceae	*Aristida contorta*	
	Aristida holathera var. *holathera*	
	Aristida sp.	
	Cymbopogon ambiguus	
	Cynodon prostratus	
	Enneapogon caerulescens	
	Enteropogon ramosus	
	Eragrostis dielsii	
	Eragrostis eriopoda	
	Eragrostis sp.	
	Eriachne ? ovata	
	Eriachne mucronata	
	Eriachne pulchella subsp. *pulchella*	
	Eriachne sp.	
	Monachather paradoxus	
	Neurachne minor	
	Poaceae sp.	
Portulacaceae	*Portulaca cyclophylla*	
Proteaceae	*Grevillea berryana*	
	Grevillea deflexa	
	Grevillea striata	
	Hakea lorea subsp. *lorea*	
	Hakea preissii	
Pteridaceae	*Cheilanthes sieberi* subsp. *sieberi*	
Rhamnaceae	*Stenanthemum mediale*	P1
Rubiaceae	*Psydrax latifolia*	
	Psydrax rigidula	
	Psydrax suaveolens	
Santalaceae	*Santalum acuminatum*	
	Santalum spicatum	
Sapindaceae	*Dodonaea pachyneura*	
Scrophulariaceae	*Eremophila compacta* subsp. *compacta*	
	Eremophila exilifolia	
	Eremophila flabellata	
	Eremophila forrestii	
	Eremophila fraseri subsp. *fraseri*	
	Eremophila glutinosa	
	Eremophila granitica	
	Eremophila jucunda subsp. *jucunda*	
	Eremophila latrobei	
	Eremophila macmillaniana	
	Eremophila oppositifolia subsp. *angustifolia*	
	Eremophila phyllopoda subsp. *phyllopoda*	
	Eremophila sp. Plumbridge Lakes (S.G.M. Carr 534)	
	Eremophila spathulata	
	Eremophila spectabilis subsp. *spectabilis*	

Family	Taxon	Conservation Status
Solanaceae	*Solanum cleistogamum*	
	Solanum lachnophyllum	
	Solanum lasiophyllum	
Stylidiaceae	*Stylidium longibracteatum*	
Zygophyllaceae	*Tribulus macrocarpus*	
	Zygophyllum sp.	

Appendix L Species by site

Taxon	GQ01	GQ02	GQ03	GQ04	GQ05	GQ06	GQ07	GQ08	GQ09	GQ10	GQ11	GQ12	GQ13	GQ14	GQ15	GQ16	GQ17	GQ18	GQ19	GQ20	GQ21	GQ22	GQ23	GQ24	GQ25	GQ26	GQ27	GQ28	GQ29	GQ30	GQ31	GQ32	GQ33	GQ34	GQ35	GQ36	GQ37	GQ38	GQ39	GQ40
Abutilon cryptopetalum																																								x
Abutilon sp.																																					x			
Acacia ? incurvaneura																																								
Acacia ? paraneura		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x		x	x	x		x		x	x	x	x	x				x		x	x
Acacia ? pteraneura	x																					x								x	x	x	x	x	x	x	x		x	x
Acacia aneura																																	x							
Acacia caesaneura											x																														
Acacia cockertoniana																														x										
Acacia craspedocarpa		x			x													x							x	x														
Acacia fuscaneura								x		x						x			x									x	x									x		
Acacia grasbyi	x																					x																		
Acacia incurvaneura																																								
Acacia incurvaneura x mulganeura																												x												
Acacia kempeana																																								
Acacia maitlandii																																								
Acacia minyura																															x									
Acacia mulganeura	x		x	x	x	x				x	x		x	x		x	x	x						x		x				x	x		x		x		x		x	
Acacia pruinocarpa							x	x											x	x		x	x																	
Acacia quadrimarginea																																								
Acacia ramulosa var. *linophylla*											x																x				x	x								
Acacia ramulosa var. *ramulosa*																																					x			
Acacia sp.																														x	x	x								
Acacia tetragonophylla	x	x			x	x			x	x		x		x	x	x	x	x			x	x	x		x	x		x	x				x			x		x	x
Acacia wanyu	x																																							x
Aluta maisonneuvei subsp. auriculata																																x								
Amyema fitzgeraldii																																								
Aristida contorta	x	x			x						x	x		x	x		x	x			x		x	x	x							x	x	x	x	x		x		
Aristida holathera var. holathera	x	x													x																								x	
Aristida sp.													x																											
Atriplex codonocarpa																																								
Cheilanthes sieberi subsp. *sieberi*														x																										x
Corymbia ferriticola																																						x		
Cratystylis subspinescens																						x																		
Cymbopogon ambiguus																																				x		x		
Cynodon prostratus																																								
Dodonaea pachyneura																																					x	x		x
Duperreya commixta																																								
Dysphania melanocarpa forma *melanocarpa*																																								
Dysphania rhadinostachya													x																											
Dysphania saxatilis																																						x		
Enchylaena tomentosa var. *tomentosa*																																						x		x
Enneapogon caerulescens																																								
Enteropogon ramosus																																								
Eragrostis dielsii																																								
Eragrostis eriopoda			x				x	x	x					x			x				x			x						x		x		x					
Eragrostis sp.																																						x		
Eremophila compacta subsp. *compacta*																																		x		x				
Eremophila exilifolia																																	x							

Taxon	GQ01	GQ02	GQ03	GQ04	GQ05	GQ06	GQ07	GQ08	GQ09	GQ10	GQ11	GQ12	GQ13	GQ14	GQ15	GQ16	GQ17	GQ18	GQ19	GQ20	GQ21	GQ22	GQ23	GQ24	GQ25	GQ26	GQ27	GQ28	GQ29	GQ30	GQ31	GQ32	GQ33	GQ34	GQ35	GQ36	GQ37	GQ38	GQ39	GQ40
Eremophila flabellata		x	x	x		x	x					x							x	x	x		x	x	x	x		x									x			x
Eremophila forrestii	x	x	x	x	x	x	x	x	x			x	x	x			x	x	x		x			x	x				x		x		x		x					
Eremophila fraseri subsp. *fraseri*	x	x			x	x	x	x	x	x	x	x	x		x	x		x	x	x			x		x	x	x		x		x		x	x	x		x			x
Eremophila glutinosa																													x	x	x	x	x	x	x		x		x	x
Eremophila granitica		x			x					x		x		x															x								x				
Eremophila jucunda subsp. *jucunda*								x				x										x										x									
Eremophila latrobei		x	x										x	x				x						x	x				x	x	x	x	x	x		x	x			
Eremophila macmillaniana																						x					x	x					x						x	
Eremophila oppositifolia subsp. *angustifolia*																																								
Eremophila phyllopoda subsp. *phyllopoda*																																								
Eremophila spathulata																						x					x	x						x		x				
Eremophila spectabilis subsp. *spectabilis*									x	x		x	x		x					x																				
Eriachne ? ovata																																								
Eriachne mucronata																																						x		
Eriachne pulchella subsp. *pulchella*																																						x		
Eriachne sp.																																								
Erodium sp.																																								
Euphorbia boophthona																														x										
Euphorbia drummondii														x																										
Goodenia ? tenuiloba																												x												
Goodenia tenuiloba																																x		x		x				
Grevillea berryana																														x	x									
Grevillea deflexa																																					x			
Grevillea striata																																								
Gunniopsis propinqua																																								
Hakea lorea subsp. *lorea*																										x													x	
Hakea preissii											x																													
Harnieria kempeana subsp. *muelleri*																																					x			x
Hibiscus sp.																																								
Hibiscus sp. Gardneri (A.L. Payne PRP 1435)																																								
Hibiscus sturtii var. *truncatus*	x				x		x	x				x	x		x		x				x			x	x					x									
Keraudrenia velutina														x				x	x				x																
Lepidium pholidogynum																																								
Lepidium sp.																																								
Maireana ? villosa																																								
Maireana carnosa											x			x																										
Maireana georgei																						x					x	x						x						
Maireana melanocoma																						x																		
Maireana sp.																																x								
Maireana tomentosa subsp. *tomentosa*						x							x	x	x	x	x				x			x							x		x	x	x	x				
Maireana villosa																																	x		x					x
Marsdenia australis			x		x								x								x			x																x
Mirbelia rhagodioides																															x									
Monachather paradoxus	x			x			x														x				x					x		x			x				
Neurachne minor																																								
Poaceae sp.																													x			x								
Psydrax latifolia																						x	x							x	x	x	x				x			
Psydrax rigidula				x								x	x	x	x		x		x			x	x						x	x	x					x		x	

Taxon	GQ01	GQ02	GQ03	GQ04	GQ05	GQ06	GQ07	GQ08	GQ09	GQ10	GQ11	GQ12	GQ13	GQ14	GQ15	GQ16	GQ17	GQ18	GQ19	GQ20	GQ21	GQ22	GQ23	GQ24	GQ25	GQ26	GQ27	GQ28	GQ29	GQ30	GQ31	GQ32	GQ33	GQ34	GQ35	GQ36	GQ37	GQ38	GQ39	GQ40
Psydrax suaveolens				x												x			x	x				x					x										x
Ptilotus nobilis																																								
Ptilotus obovatus	x					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x				x	x	x				x		x	x			x	x
Ptilotus roei																											x							x	x	x				
Ptilotus rotundifolius																						x																		
Ptilotus schwartzii																						x						x		x		x	x	x	x	x				
Rhagodia drummondii																																								x
Rhagodia eremaea																					x		x										x							
Santalum spicatum																							x																	
Scaevola spinescens																																								
Sclerolaena cuneata																											x													x
Sclerolaena densiflora											x	x	x								x								x											
Sclerolaena diacantha														x							x												x							
Sclerolaena eriacantha																											x													
Sclerolaena tetragona																																		x	x					
Senna artemisioides subsp. *filifolia*																																								
Senna artemisioides subsp. *helmsii*			x						x												x								x								x		x	x
Senna artemisioides subsp. *oligophylla x helmsii*							x								x														x											
Senna artemisioides subsp. *x artemisioides*																											x													
Senna artemisioides s ubsp. *x sturtii*			x												x																									
Senna glaucifolia												x																			x									
Senna glaucifolia (hybrid)																															x									
Senna glutinosa subsp. *x luerssenii*																																								
Senna sp.								x					x											x					x											
Senna sp. Meekatharra (E. Bailey 1-26)	x																					x					x	x					x		x				
Senna sp. Meekatharra (E. Bailey 1-26) hybrid																																								
Sida ? cardiophylla																																						x		
Sida ectogama		x								x					x							x			x									x					
Sida fibulifera	x													x				x													x		x					x		
Sida platycalyx																													x											
Sida sp.				x																																				
Sida sp. dark green fruits (S. van Leeuwen 2260)							x																																	
Solanum cleistogamum																															x							x		
Solanum lachnophyllum																															x									
Solanum lasiophyllum	x			x	x	x	x			x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x
Spartothamnella teucriiflora				x	x								x	x		x							x		x							x						
Stackhousia sp.																																								
Stenanthemum mediale																																								
Stenopetalum anfractum																																			x					
Streptoglossa sp.																																								
Stylidium longibracteatum																																								
Tecticornia ? auriculata																																								
Thryptomene decussata																																								
Tribulus macrocarpus																												x												
Zygophyllum sp.																																								

Taxon	GQ41	GQ42	GQ43	GQ44	GQ45	GQ46	GQ47	GQ48	GQ49	GQ50	GQ51	GQ52	GQ54	GQ55	GQ56	GQ57	GQ58	GQ59	GQ60	GQ61	GQ62	GQFF01	GR01	GR02	GR03	GR04	GR05	GR06	GR07	GR08	GR09	GR10	GR11	GR12	GR13	GRFF01
Abutilon cryptopetalum																																				
Abutilon sp.																																				
Acacia ? incurvaneura																												x								
Acacia ? paraneura		x		x	x	x	x		x	x						x			x	x					x	x			x		x					
Acacia ? pteraneura			x				x			x			x	x				x	x		x	x						x		x			x	x	x	x
Acacia aneura													x																								
Acacia caesaneura																																				
Acacia cockertoniana	x						x																													
Acacia craspedocarpa															x											x										
Acacia fuscaneura	x	x			x											x	x						x			x					x		x			
Acacia grasbyi	x			x	x					x					x	x	x						x			x		x	x	x	x		x	x		x
Acacia incurvaneura														x											x											
Acacia incurvaneura x mulganeura																																				
Acacia kempeana																			x			x														
Acacia maitlandii																																				x
Acacia minyura																																				
Acacia mulganeura					x		x													x	x															
Acacia pruinocarpa					x		x			x									x				x													x
Acacia quadrimarginea										x																										
Acacia ramulosa var. *linophylla*	x																			x																
Acacia ramulosa var. *ramulosa*																																				
Acacia sp.																			x																	
Acacia tetragonophylla		x	x		x		x		x	x	x									x	x									x				x		
Acacia wanyu																										x				x				x		
Aluta maisonneuvei subsp. auriculata																																				
Amyema fitzgeraldii										x																										
Aristida contorta	x	x	x		x					x	x	x	x		x			x	x	x						x	x	x		x		x	x	x	x	
Aristida holathera var. holathera																																				
Aristida sp.																																				
Atriplex codonocarpa				x								x																	x	x				x	x	
Cheilanthes sieberi subsp. *sieberi*					x																															
Corymbia ferriticola	x													x	x	x	x						x					x					x			
Cratystylis subspinescens								x																												
Cymbopogon ambiguus	x														x		x						x		x			x								
Cynodon prostratus												x																								
Dodonaea pachyneura	x														x		x						x					x	x	x	x		x	x		
Duperreya commixta								x																												
Dysphania melanocarpa forma *melanocarpa*					x																															
Dysphania rhadinostachya																																				
Dysphania saxatilis																				x			x					x				x				
Enchylaena tomentosa var. *tomentosa*																							x													
Enneapogon caerulescens												x																								
Enteropogon ramosus		x																																		
Eragrostis dielsii																					x															
Eragrostis eriopoda						x	x																													
Eragrostis sp.																	x																			
Eremophila compacta subsp. *compacta*							x																													
Eremophila exilifolia																																				

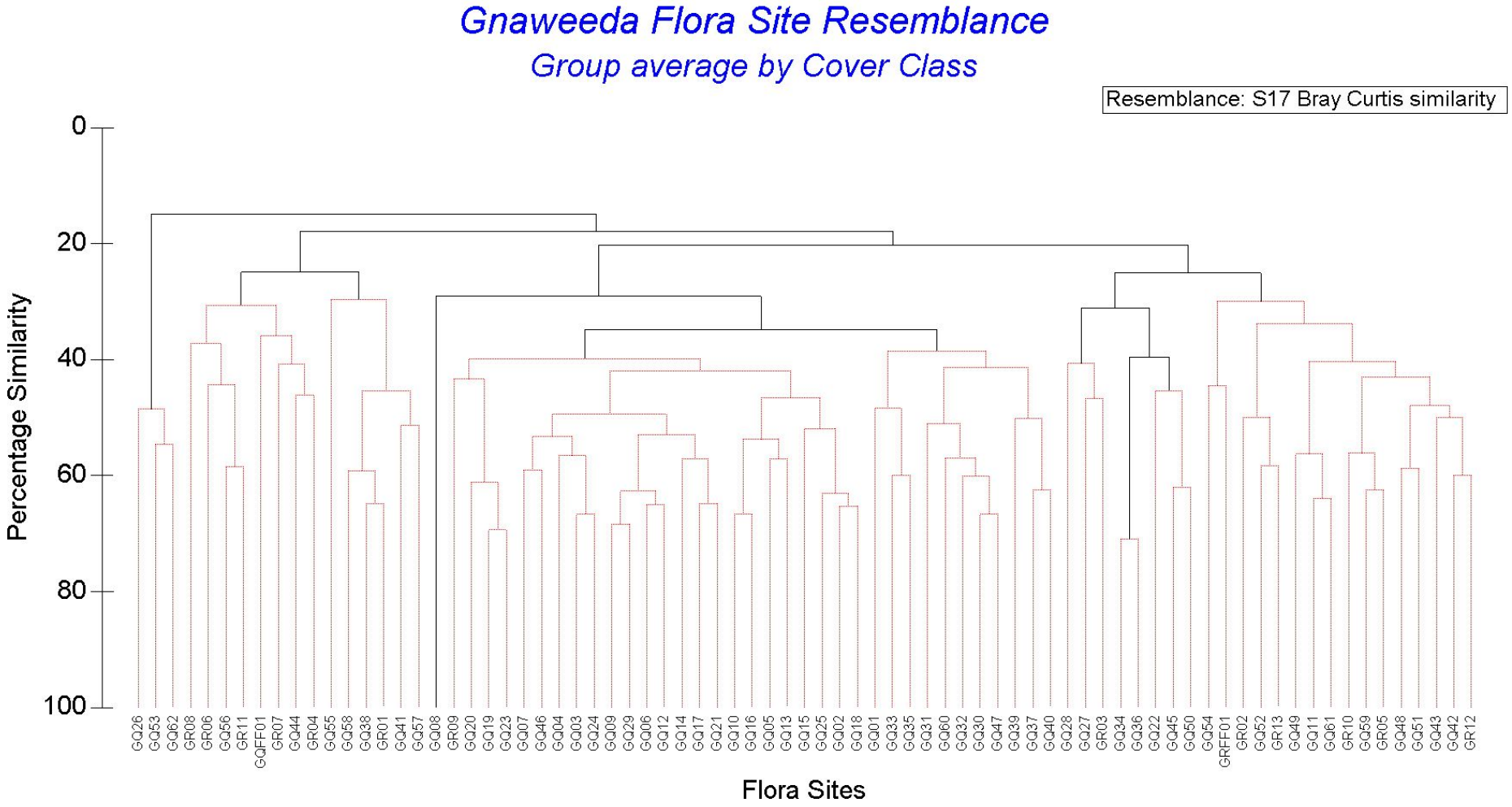
Taxon	GQ41	GQ42	GQ43	GQ44	GQ45	GQ46	GQ47	GQ48	GQ49	GQ50	GQ51	GQ52	GQ54	GQ55	GQ56	GQ57	GQ58	GQ59	GQ60	GQ61	GQ62	GQFF01	GR01	GR02	GR03	GR04	GR05	GR06	GR07	GR08	GR09	GR10	GR11	GR12	GR13	GRFF01
Eremophila flabellata															x		x											x		x	x		x			x
Eremophila forrestii						x				x										x																
Eremophila fraseri subsp. *fraseri*		x					x	x	x	x	x		x							x	x	x					x			x				x		x
Eremophila glutinosa	x			x	x		x							x	x	x	x		x							x		x				x			
Eremophila granitica																						x								x						
Eremophila jucunda subsp. *jucunda*																																				
Eremophila latrobei	x				x	x	x			x				x		x	x		x				x					x	x		x					
Eremophila macmillaniana		x	x	x	x			x		x	x				x			x					x		x	x	x			x	x	x	x	x	x	
Eremophila oppositifolia subsp. *angustifolia*																							x						x			x	x			x
Eremophila phyllopoda subsp. *phyllopoda*			x																																	
Eremophila spathulata			x		x					x									x						x					x						
Eremophila spectabilis subsp. *spectabilis*						x			x													x														x
Eriachne ? ovata																					x															
Eriachne mucronata																							x						x							
Eriachne pulchella subsp. *pulchella*																	x						x									x				
Eriachne sp.					x																															
Erodium sp.						x					x																									
Euphorbia boophthona											x																									
Euphorbia drummondii												x																								
Goodenia ? tenuiloba																																				
Goodenia tenuiloba							x																													
Grevillea berryana							x												x																	
Grevillea deflexa															x																					
Grevillea striata			x																																	
Gunniopsis propinqua												x															x									
Hakea lorea subsp. *lorea*																																				
Hakea preissii		x			x								x															x								
Harnieria kempeana subsp. *muelleri*																																				
Hibiscus sp.							x																													
Hibiscus sp. Gardneri (A.L. Payne PRP 1435)																												x								
Hibiscus sturtii var. *truncatus*					x														x																	
Keraudrenia velutina																	x																			
Lepidium pholidogynum																							x													
Lepidium sp.																																	x			
Maireana ? villosa														x																						
Maireana carnosa		x							x		x	x						x		x				x			x							x	x	
Maireana georgei																						x		x						x					x	
Maireana melanocoma			x	x											x									x							x	x				x
Maireana sp.																																				
Maireana tomentosa subsp. *tomentosa*					x					x																										
Maireana villosa																																				
Marsdenia australis						x																														
Mirbelia rhagodioides																																				
Monachather paradoxus	x					x	x												x																	
Neurachne minor	x																											x								
Poaceae sp.							x																													
Psydrax latifolia					x		x			x									x												x					
Psydrax rigidula						x	x				x								x										x		x					

Taxon	GQ41	GQ42	GQ43	GQ44	GQ45	GQ46	GQ47	GQ48	GQ49	GQ50	GQ51	GQ52	GQ54	GQ55	GQ56	GQ57	GQ58	GQ59	GQ60	GQ61	GQ62	GQFF01	GR01	GR02	GR03	GR04	GR05	GR06	GR07	GR08	GR09	GR10	GR11	GR12	GR13	GRFF01
Psydrax suaveolens																																				
Ptilotus nobilis				x								x												x									x		x	
Ptilotus obovatus	x	x	x	x	x	x		x	x	x	x		x					x	x	x			x	x	x	x	x	x	x	x	x		x	x	x	x
Ptilotus roei			x		x			x		x	x	x																							x	
Ptilotus rotundifolius					x					x	x								x																	
Ptilotus schwartzii	x				x		x	x						x	x	x			x									x								
Rhagodia drummondii					x	x																														
Rhagodia eremaea										x																										
Santalum spicatum																																				
Scaevola spinescens				x		x				x																										
Sclerolaena cuneata								x				x												x											x	
Sclerolaena densiflora	x	x	x	x	x			x	x	x	x	x	x					x		x		x		x			x					x		x		
Sclerolaena diacantha				x											x											x			x			x		x	
Sclerolaena eriacantha																																				
Sclerolaena tetragona																																				
Senna artemisioides subsp. *filifolia*				x																																
Senna artemisioides subsp. *helmsii*			x		x					x						x			x	x						x				x					
Senna artemisioides subsp. *oligophylla x helmsii*																																				
Senna artemisioides subsp. *x artemisioides*													x									x		x						x			x			x
Senna artemisioides s ubsp. *x sturtii*						x																														
Senna glaucifolia		x	x																x																	
Senna glaucifolia (hybrid)																																				
Senna glutinosa subsp. *x luerssenii*																										x										
Senna sp.										x																										
Senna sp. Meekatharra (E. Bailey 1-26)		x	x	x							x	x						x				x		x	x						x	x	x	x	x	x
Senna sp. Meekatharra (E. Bailey 1-26) hybrid																						x														
Sida ? cardiophylla	x																x																			
Sida ectogama										x															x						x					
Sida fibulifera																																				
Sida platycalyx																																				
Sida sp.																				x																
Sida sp. dark green fruits (S. van Leeuwen 2260)					x																															
Solanum cleistogamum																	x																			
Solanum lachnophyllum																														x						
Solanum lasiophyllum		x	x	x	x	x	x	x		x	x		x		x	x	x	x	x	x			x		x	x		x			x		x	x	x	x
Spartothamnella teucriiflora					x					x																										
Stackhousia sp.															x																					
Stenanthemum mediale																												x								
Stenopetalum anfractum			x								x			x														x								
Streptoglossa sp.																																			x	
Stylidium longibracteatum															x													x								
Tecticornia ? auriculata																																			x	
Thryptomene decussata															x										x			x								
Tribulus macrocarpus																																				
Zygophyllum sp.																											x									

Appendix M Priority flora locations within the Study Area

Taxon	GPS Coordinates (GDA 94, Zone 50J)		Number of individuals
	Easting	Northing	
Gunniopsis propinqua (P3)	672449	7095900	Unknown (this taxon was collected as a dead annual specimen)
	673103	7095765	
Stenanthemum mediale (P1)	673524	7095656	10
	673722	7095594	40 across these two locations
	673744	7095550	
	674335	7095212	14
	674877	7094994	35
	672671	7095718	7

Appendix N Dendrogram of flora site data


Gnaweeda Flora Site Resemblance
Group average by Cover Class
Resemblance: S17 Bray Curtis similarity
Percentage Similarity
0
20
40
60
80
100
GQ26 GQ53 GQ62 GR08 GR06 GQ56 GR11 GQFF01 GR07 GQ44 GR04 GQ55 GQ58 GQ38 GR01 GQ41 GQ57 GQ08 GR09 GQ20 GQ19 GQ23 GQ07 GQ46 GQ04 GQ03 GQ24 GQ09 GQ29 GQ06 GQ12 GQ14 GQ17 GQ21 GQ10 GQ16 GQ05 GQ13 GQ15 GQ25 GQ02 GQ18 GQ01 GQ33 GQ35 GQ31 GQ60 GQ32 GQ30 GQ47 GQ39 GQ37 GQ40 GQ28 GQ27 GR03 GQ34 GQ36 GQ22 GQ45 GQ50 GQ54 GRFF01 GR02 GQ52 GR13 GQ49 GQ11 GQ61 GR10 GQ59 GR05 GQ48 GQ51 GQ43 GQ42 GR12
Flora Sites

Perth
41 Bishop Street,
Jolimont , WA 6014
Tel +61 (08) 9388 8799
Fax +61 (08) 9388 8633
www.mwhglobal.com