

Onslow Metals  
Turtle and Range Deposits  
Level 1 Flora Survey



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## Executive Summary

Onslow Metals propose to conduct drilling and exploration activities and activate a quarry over the Turtle and Range tenements, approximately 80km south of Onslow. A reconnaissance survey and level one flora report were prepared for the site.

The site has had some historic drilling and exploration activities, resulting in localised vegetation disturbance. Turtle Deposit tenement is 50ha in size and Range tenement is 120ha in size. The area that Onslow Metals will potentially disturb is approximately 15ha.

Searches of the DEC databases revealed that two Priority flora were known to occur within the vicinity of the site. Neither of these species was observed during the reconnaissance survey. Following a review of other surveys within the area, and the habitat preferences of these two species, it was deemed that these species do not occur on the Onslow Metals tenements.

The vegetation at the site ranges in condition from Good to Poor condition. Vegetation which is in Good condition has the potential to deteriorate over time with two introduced species recorded for the site having a 'high' rating as an environmental weed. The site does not contain any Threatened or Priority Ecological Communities and the vegetation units are well represented in a regional context.

As there are no Threatened or Priority flora, the vegetation and flora of the site has no conservation significance. It is not expected that the proposed exploration and quarrying activities will negatively impact the flora and vegetation in a regional context.

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# Table of Contents

1.0	Introduction	1
1.1	Project Background	1
1.2	Scope and Objectives	1
1.3	Location of Project Area	1
1.4	Existing Environment	2
1.4.1	IBRA	2
2.0	Methods	3
2.1	Desktop Review	3
2.2	Reconnaissance Survey	4
3.0	Results	4
3.1	Desktop Review	4
3.1.1	EPBC Protected Matters Database Search	4
3.1.2	Threatened and Priority Flora – DEC Database Search	4
3.1.3	Threatened Ecological Communities – DEC Database Search	6
3.1.4	Literature Review	6
3.2	Introduced Flora	7
3.3	Vegetation Units	9
3.4	Vegetation Condition	12
4.0	Conclusions	14
5.0	References	16

## List of Figures

Figure 1. Onslow Metals Turtle and range Deposit tenement areas	2
Figure 2a. Vegetation units of the Turtle Deposit tenement (M08/273), delineated during the reconnaissance survey	11
Figure 2b. Vegetation units of the Range Deposit tenement (M08/272), delineated during the reconnaissance survey	11
Figure 3a. Vegetation condition of the Turtle Deposit tenement (M08/273)	13

Figure 3b. Vegetation condition of the Range Deposit tenement (M08/272)	14
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### **List of Plates**

Plate 1. Low Hill Vegetation of Turtle Deposit	9
Plate 2. Open <i>Acacia</i> Woodland of the Turtle Deposit	10
Plate 3. Open <i>Corymbia</i> Woodland of the Range Deposit	10

### **List of Appendices**

Appendix A – EPBC Protected Matters Database Search	18
Appendix B – Conservation Codes and Definitions	25
Appendix C – DEC Database Search Results	26
Appendix D – List of Flora Found During Reconnaissance Survey	41

# 1.0 Introduction

## 1.1 Project Background

Onslow Metals proposes to undertake exploration and develop a quarry and associated infrastructure within the Cane River Conservation Park approximately 80km south of Onslow. The activities are proposed to occur over two mining tenements, M08/272 (Range Deposit) and M08/273 (Turtle Deposit). Onslow Metals commissioned Newman Environmental to undertake a level one flora survey of the site during June 2011.

## 1.2 Scope and Objectives

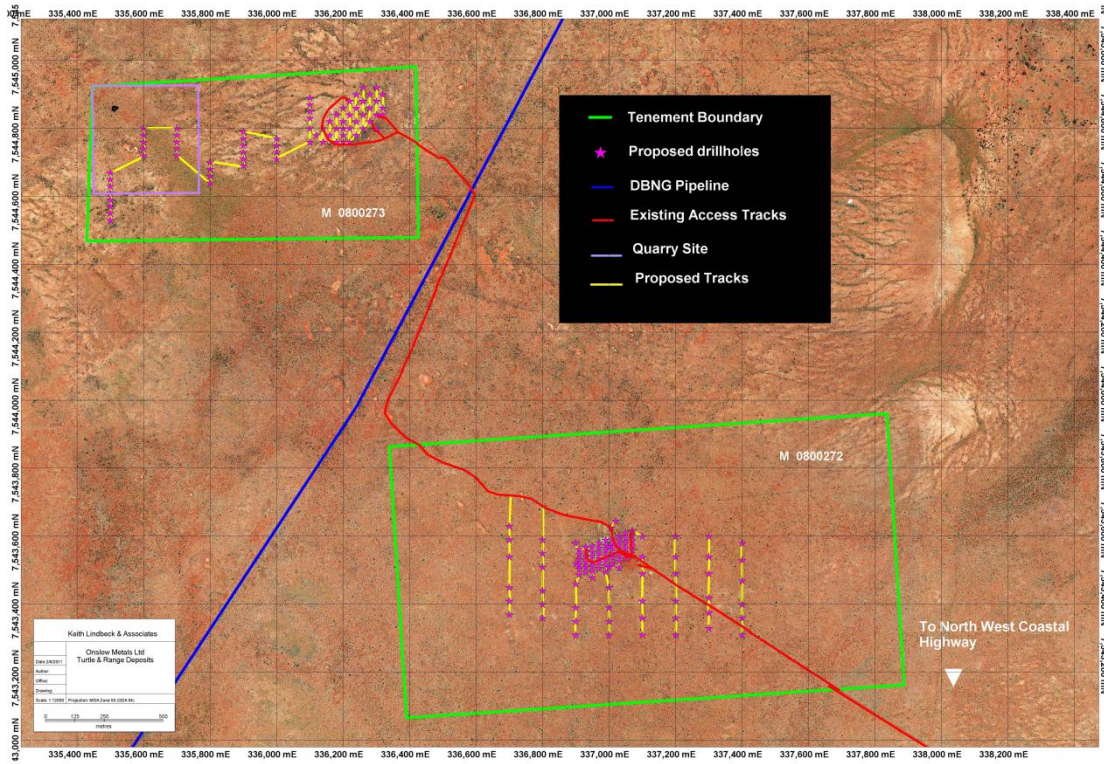
This report documents the results of a level one flora survey over the site. The report and site visit was conducted in accordance with *EPA Guidance Statement No. 51, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, Level 1* and *EPA Position Statement No. 3, Terrestrial Biological Surveys as an Element of Biodiversity Protection*. The objectives of the survey were to:

- Conduct a desktop review to collect ecological information relevant to the project areas and surrounds;
- Undertake a site visit to characterise the flora of the site, and to determine the presence of any flora of conservation significance.
- Characterise the vegetation units and vegetation condition of the site.

## 1.3 Location of Project Area

The project is located approximately 80km south of Onslow within the Cane River Conservation Park off the North West Coastal Highway (**Figure 1** shows the tenement areas). The Range tenement area is approximately 120 hectares in size and the Turtle tenement area is approximately 50 hectares in size. The total area that Onslow Metals are proposing to disturb totals 15 hectares of which

approximately 10 hectares are associated with the proposed quarry and 5 hectares of proposed drilling activity.



**Figure 1.** Onslow Metals Turtle and Range tenement areas.

## 1.4 Existing Environment

### 1.4.1 IBRA

The area of proposed disturbance is located in the Pilbara biogeographic region as defined in the Interim Biogeographic Regionalisation for Australia (IBRA) (Australian Government, 2009). Biogeographic regions are grouped based on similarities in geology, climate, vegetation and fauna. The Pilbara biogeographic region is comprised of four sub-regions; Hamersley, Fortescue Plains, Chichester and Roeburne (Thackway and Cresswell, 1995). Sub-regional mapping shows that the Onslow Metals tenements occur in the Hamersley (Pil3) sub-region, described in the



Bioregional Summary of the 2002 Biodiversity Audit for Western Australia by Kendrick (2002) as;

“Mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite). Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges. The climate is semi-desert tropical, average 300mm rainfall, usually in summer cyclonic or thunderstorm events. Winter rainfall is not uncommon. Drainage to either the Fortescue to the north, the Ashburton to the south, or the Robe to the west.”

## **2.0 Methods**

### **2.1 Desktop Review**

A review of databases and publicly available information was conducted prior to the reconnaissance field survey. The desktop review consisted of the following:

- A search of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 Protected Matters database for flora of conservation significance and Threatened Ecological Communities (TEC) known, or likely, to occur within the survey areas;
- A search of the Department of Environment and Conservation (DEC) Threatened (Declared Rare) Flora database, the Western Australian Herbarium (WAHERB) database and the Declared Rare and Priority Flora List for rare and priority flora known, or likely, to occur within the survey areas;
- A search of the DEC TEC database for listings of communities known, or likely, to occur within the survey areas;
- A limited review of publicly available ecological information pertaining to the survey areas and surrounds.

## **2.2 Reconnaissance Field Survey**

The proposed sites of disturbance were traversed by foot, and descriptions and photographs were taken between the 07/05/2011 and the 09/05/2011. The reconnaissance survey was conducted by Dr Belinda Newman of Newman Environmental.

All flora was identified by Dr Belinda Newman, who is familiar with the flora of the area. Specimens of all flora listed in the report were collected and identified in consultation with the relevant taxonomic guides. Vegetation units were determined on site and photographs of the representative vegetation were taken for detailed description in this report.

## **3.0 Results**

### **3.1 Desktop Review**

#### **3.1.1 Environment Protection and Biodiversity Conservation (EPBC) Act 1999 Protected Matters Database Search**

No plant species were listed as vulnerable under the EPBC listings.

No Threatened Ecological Communities (TECs) were listed as occurring within a ten kilometre radius of the site.

The EPBC Protected Matters Database Search results can be found in **Appendix A**.

#### **3.1.2 Threatened and Priority Flora – DEC Database Search**

One Priority One flora species (as defined by the Western Australian *Wildlife Conservation Act 1950*) has been recorded as occurring within a 40km radius of the

proposed area of disturbance; *Helichrysum oligochaetum*. One Priority Three flora species was recorded from the search area; *Triumfetta echinata*. Conservation Codes are included in **Appendix B** and DEC database search results are included in **Appendix C**.

*Helichrysum oligochaetum* is an erect annual herb that grows to 25cm high. It is typically found on red clay on alluvial plains across the Pilbara bioregion. The closest recorded specimen has been found approximately 6.5km from the project area on a disturbed area of red, clay soil with other *Asteraceae* sp. and *Cenchrus ciliaris*.

*Triumfetta echinata* is a prostrate shrub that grows to 30cm high. It is typically found on red sandy soils and sand dunes around Onslow and to the north of Onslow. The closest recorded specimen has been found 25 km from the project area in open *Grevillea stenobotrya*, *Acacia coriacea* subsp. *coriacea* shrubland over *Triodia epactia* and *Triodia schinzii* open hummock grassland.

Neither of these two Priority Flora were found in the previous surveys over the project area conducted by Jims Seeds, Weeds and Trees (2004) and Botanica Consulting (2007). Another flora and vegetation survey conducted within the region also found no Threatened or Priority Flora (Astron, 2009). The preferred habitat for *Helichrysum oligochaetum* was not observed during the reconnaissance survey. The preferred habitat of *Triumfetta echinata* could describe much of the substrate of the Turtle and Range tenements, however the co-occurring *Grevillea stenobotrya* and *Acacia coriacea* subsp. *coriacea* from the nearest recorded occurrence was not observed during this survey.

A full list of flora recorded during the reconnaissance survey is found in **Appendix D**.

### **3.1.3 Threatened Ecological Communities – DEC Database Search**

No Threatened or Priority Ecological Communities were listed by the DEC as occurring in the database search area.

### **3.1.4 Literature Review**

**Jim's Seeds, Weeds and Trees (2004), *Priority flora assessment for Onslow Mineral Exploration, of the proposed Range and Turtle Project ground disturbance area***

This report presents the findings of a priority flora survey over the Range and Turtle leases conducted in September 2004. No Rare or Priority flora species were found during this survey.

**Botanica (2007), *Flora and vegetation Survey of the Turtle and Range Projects (M08/272 and M08/273)***

This report presents the findings of a flora and vegetation survey over the Turtle and Range leases conducted in June 2007. No Rare or Priority flora species were found during the survey. One vegetation unit was defined as Acacia Low Open Woodland over Spinifex. It was defined as occurring over the entire tenement. The vegetation was deemed to be in 'good' condition in relation to the Keighery Condition Scale, with disturbances in the form of historic exploration activities.

**Astron Environmental Services (2009). *BHPB Macedon Gas Development Flora and Vegetation Survey (Phases 1 and 2)*.**

This report presents the findings of a level one flora and vegetation survey for the Macedon Gas Development. Although this survey does not cover the Turtle and Range tenements it is within a 30km radius of the site and lends a regional context to

the desktop review, covering approximately 1 200 ha. No Rare or Priority species were identified during this study

### **3.2 Introduced Flora**

Three species of introduced flora were found during the survey; *Vachellia farnesiana* (Mimosa Bush), *Cenchrus ciliaris* (Buffel Grass) and *Portulaca oleracea* (Purslane).

Mimosa Bush (*Vachellia farnesiana*) is an erect thorny, thicket forming tree or shrub. Mimosa Bush was observed on the Turtle tenement, in extremely low abundance (only three bushes seen). Mimosa Bush was seen on the north western side of the low hill vegetation along one of the minor drainage lines.

Buffel Grass (*Cenchrus ciliaris*) is a tufted, tussocky perennial that has become widespread and naturalised across the Pilbara. Buffel Grass was widespread across both tenements, although in very low abundance. It was most often observed around existing drillhole areas, access roads and other areas of disturbance.

Purslane (*Portulaca olearia*) is a succulent annual herb. Purslane was also widespread across both tenements, also in very low abundance. Observations of Purslane across the site were likely to be the result of recent rains in the area. Purslane was found on the lower plain areas, growing in open sandy areas.

None of the introduced species recorded are Declared Weeds under the *Agricultural and Related Resources Protection Act 1976*. However, *Cenchrus ciliaris* and *Vachellia farnesiana* are listed as an Environmental Weed with a 'High' rating under the *Environmental Weed Strategy for Western Australia* (DEC, 1999).

Weeds listed as Environmental Weeds are rated according to three criteria:

- Invasiveness ability to invade bushland in good to excellent condition or ability to invade waterways. (Score as yes or no).
- Distribution – wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world. (Score as yes or no).
- Environmental Impacts – ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community. (Score as yes or no).

The rating of each weed is then given according to the following scoring system:

- High - a weed species would have to score yes for all three criteria. Rating a weed species as high would indicate prioritising this weed for control and/or research ie. prioritising funding to it.
- Moderate - a weed species would have to score yes for two of the above criteria. Rating a weed species as moderate would indicate that control or research effort should be directed to it if funds are available, however it should be monitored (possibly a reasonably high level of monitoring).
- Mild – a weed species scoring one of the criteria. A mild rating would indicate monitoring of the weed and control where appropriate.
- Low – a weed species would score none of the criteria. A low ranking would mean that this species would require a low level of monitoring.

(From DEC, 1999, p. 59)

### 3.3 Vegetation Units

Three vegetation units were delineated during the reconnaissance survey and their locations are shown in **Figures 2a, b.**:

- Low Hill Vegetation – *Acacia bivenosa*, *Senna glutinosa* subsp. *pruinosa*, *Acacia ancistrocarpa* low open woodland over *Solanum lasiophyllum*, *Sida rohlenae* subsp. *rohlenae* and *Triodia basedowii*, *Triodia wiseana* mixed shrubs and herbs. This vegetation is restricted to the low hill of the Turtle Deposit tenement (**Plate 1** and **Figure 2a**)



**Plate 1.** Low Hill Vegetation unit of Turtle Deposit

- Open Acacia Woodland – *Acacia inaequilatera*, *Acacia ancistrocarpa*, *Acacia bivenosa* and occasional *Hakea lorea* subsp. *lorea* and *Grevillea wickhamii* subsp. *hispidula* sparse low open woodland over *Senna artemisioides* subsp. *helmsii*, *Solanum lasiophyllum* and *Ptilotus obovatus* subsp. *obovatus* very sparse mixed shrubs and *Triodia wiseana* and *Triodia lanigera* open hummock grassland. This vegetation type is found across the flat plains of the Turtle tenement (**Plate 2** and **Figure 2a**).



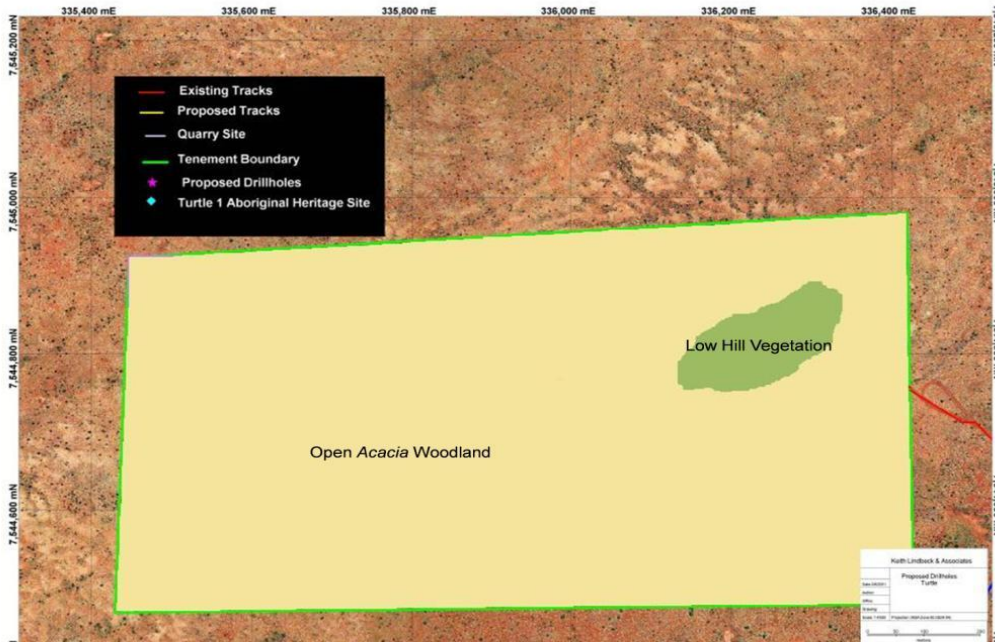
**Plate 2.** Open Acacia Woodland of Turtle Deposit

- Open Corymbia Woodland – Emergent *Corymbia zygomorpha* and *Acacia ancistrocarpa*, *Acacia bivenosa* and *Acacia inaequilatera* sparse low open woodland over *Senna artemisioides* subsp. *oligophylla*, *Senna artemisioides* subsp. *helmsii* and *Acacia trachycarpa* mixed shrubs and *Aristida holathera* subsp. *holathera*, *Enneapogon caeruleus*, *Triodia wiseana*, *Triodia basedowii* and *Triodia lanigera* hummock grassland. This vegetation is found across the entire Range Deposit tenement (**Plate 3** and **Figure 2b**).

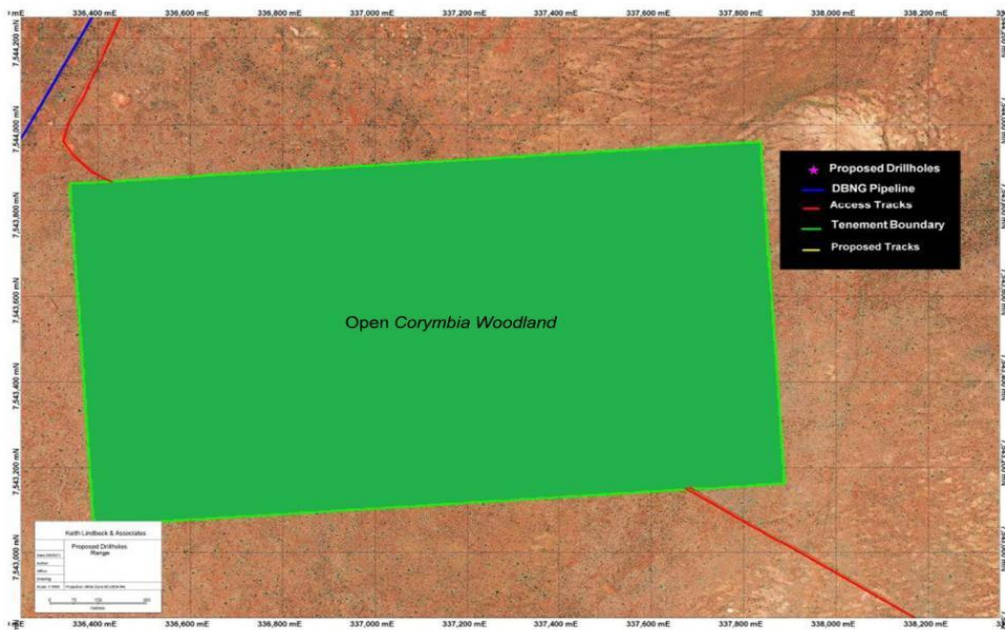


**Plate 3.** Open *Corymbia* Woodland of Range Deposit.





**Figure 2a.** Vegetation units of the Turtle Deposit tenement (M08/273) delineated during the reconnaissance survey.



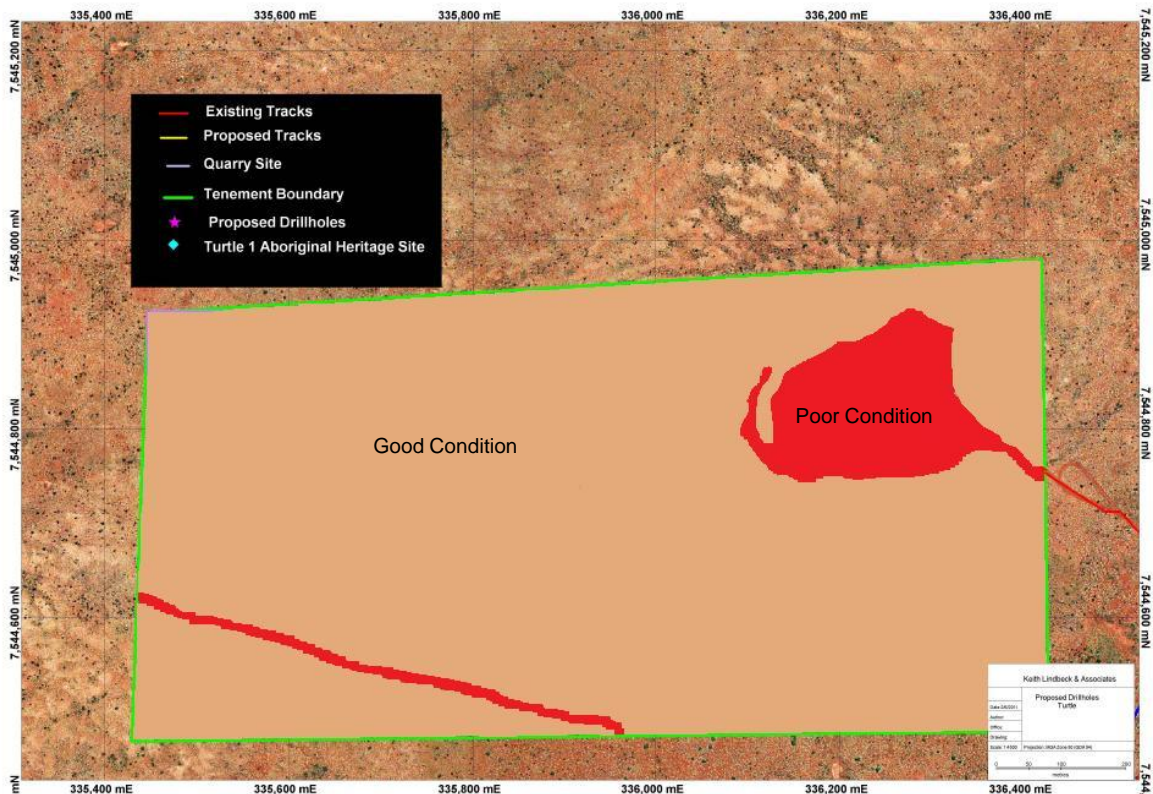
**Figure 2b.** Vegetation units of the Range Deposit tenement (M08/272) delineated during the reconnaissance survey.

### 3.4 Vegetation Condition

Vegetation across the site ranged from Good to Poor according to the Keighery Vegetation Condition Scale (Keighery, 1994).

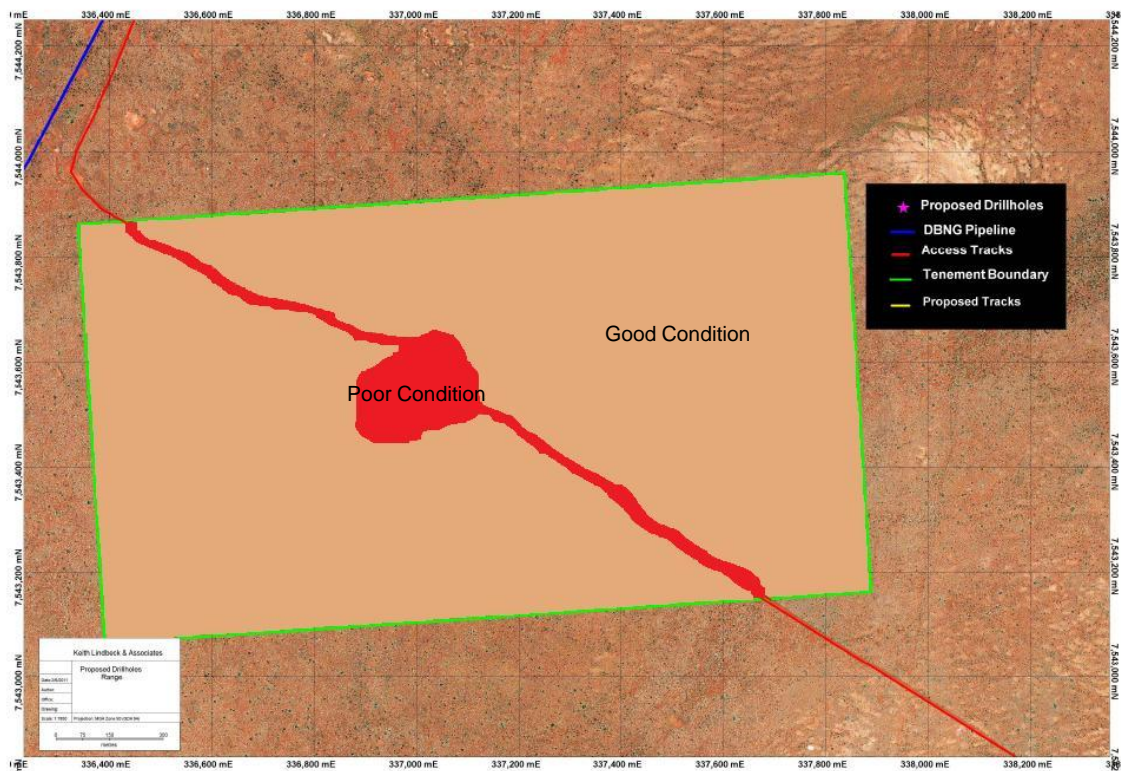
Over the Turtle Deposit tenement, vegetation condition over the low hill area was generally poor (**Figure 3a**). Previous mining and exploration activities have left the vegetation remaining on this low hill in a degraded condition. The diversity of vegetation over this area is also generally low and this is one of the main areas of localised weed invasion observed over the entire tenement. This area had *Vachellia farnesiana*, localised to one minor drainage line on the north eastern side of the hill. There was also very sparsely distributed *Cenchrus ciliaris*.

The rest of the Turtle tenement was generally in good condition. Small areas of poor condition vegetation were localised to old exploration tracks. Generally vegetation has retained its structure and very few weeds were observed. Recent stripping of leaf material from a majority of plants was due to locust plagues observed in the area. This is a short term disturbance and does not affect the vegetation condition assessment.



**Figure 3a.** Vegetation condition of the Turtle Deposit tenement (M08/273).

The vegetation condition of the Range tenement ranges from good to poor condition (**Figure 3b**). Disturbance is high in a localised area surrounding the pre-existing drilling areas. These intensively worked areas were assessed as being in poor condition due to a higher abundance of weeds, namely *Cenchrus ciliaris* and some *Portulaca oleracea*. The rest of the tenement was assessed as being in good condition, with very little weed invasion.



**Figure 3b.** Vegetation condition of the Range Deposit tenement (M08/272).

## 4.0 Conclusions

Database searches for the site returned a list of two Priority flora species occurring in the search area. A review of habitat preferences and other surveys conducted in the area, led to the conclusion that *Helichrysum oligochaetum* does not occur at the survey site. Prior to this survey, it was deemed possible that *Triumfetta echinatum* could occur over the survey site, however it was not observed during this survey and the vegetation it associates with was also not observed over the tenements. It is concluded that neither *Helichrysum oligochaetum* or *Triumfetta echinatum* occur over the Turtle or Range tenements. No Threatened or Priority species were observed during the reconnaissance survey.

The site does not contain any Threatened or Priority Ecological Communities and the vegetation units are well represented in a regional context. Much of the remnant vegetation at the site is in Good to Poor condition. Vegetation which is in Good condition has the potential to deteriorate over time with the presence of the highly invasive environmental weeds *Cenchrus ciliaris* and *Vachellia farnesiana* recorded in low abundance across both tenements.

As there are no Threatened or Priority flora, the vegetation and flora of the site has little conservation significance. It is not expected that further exploration activities and activation of the quarry will negatively impact the flora and vegetation in a regional context.

The presence of two weed species with a 'high' rating as an Environmental Weed under the *Environmental Weed Strategy for Western Australia* (DEC, 1999) is of major consideration for the project. It is recommended that should the project proceed, a weed management plan be developed to ensure procedures are in place to minimise the spread and introduction of weeds as a result of infrastructure development.

## 5.0 References

Astron Environmental Services (2009). *BHPB Macedon Gas Development Flora and Vegetation Survey (Phases 1 and 2)*.

Australian Government (2009). *Interim Biogeographic Regionalisation of Australia (IBRA)*

*Version 6.1*, Department of the Environment, Water, Heritage and the Arts.

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Kendrick, P. (2002). Pilbara 3 (PIL3 – Hamersley subregion), in McKenzie, N., May, J., McKenna, S (eds.) *Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*. Department of Conservation and Land Management, pp 568-580.

Thackway, R., and Cresswell, I. (1995). *An Interim Biogeographic Regionalisation for Australia: A Framework for Establishing the National System of Reserves, Version 4.0*. Australian Nature Conservancy Agency.

## Appendix A – EPBC Protected Matters Database Search

EPBC Act Protected Matters Report: Coordinates

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report. You may wish to print this report for reference before moving to other pages or websites. Information about the EPBC Act including significance guidelines, forms and application process details can be found at

<http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

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

Coordinates Buffer: 10Km

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### Summary

#### Details

Matters of NES

Other matters protected by the EPBC Act

Extra Information

#### Caveat

#### Acknowledgements

#### Protected Matters Search Tool

### Summary

Matters of National Environmental Significance

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

World Heritage Properties: None

National Heritage Places: None



Wetlands of International Significance (Ramsar

Wetlands): None

Great Barrier Reef Marine Park: None

Commonwealth Marine Areas: None

Threatened Ecological Communities: None

Threatened Species: 3

Migratory Species: 10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere. The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html> Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps. A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov.au/epbc/permits/index.html>.

Commonwealth Lands: None

Commonwealth Heritage Places: None

Listed Marine Species: 8

Whales and Other Cetaceans: None

Critical Habitats: None

Commonwealth Reserves: None

Report Summary for Extra Information

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

Place on the RNE: None

State and Territory Reserves: 1

Regional Forest Agreements: None

Invasive Species: 8

Nationally Important Wetlands: None

## **Details**

### **Matters of National Environmental Significance**

#### **Threatened Species [ Resource Information ]**

Name Status Type of Presence

#### **MAMMALS**

*Dasyercus cristicauda* Mulgara [328] Vulnerable Species or species habitat likely to occur within area

*Dasyurus hallucatus* Northern Quoll [331] Endangered Species or species habitat likely to occur within area

*Rhinonicteris aurantia* (Pilbara form) Pilbara Leaf-nosed Bat [82790] Vulnerable Species or species habitat likely to occur within area

#### **Migratory Species [ Resource Information ]**

Name Status Type of Presence

#### **Migratory Marine Birds**

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

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

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

#### **Migratory Terrestrial Species**

*Haliaeetus leucogaster* White-bellied Sea-Eagle [943] Species or species habitat likely to occur within area

*Hirundo rustica* Barn Swallow [662] Species or species habitat may occur within area

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

### **Migratory Wetlands Species**

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

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

Charadrius veredus Oriental Plover, Oriental Dotterel [882] Species or species habitat may occur within area

Glareola maldivarum Oriental Pratincole [840] Species or species habitat may occur within area

### **Other Matters Protected by the EPBC Act**

#### **Listed Marine Species [ Resource Information ]**

Name Status Type of Presence

#### **Birds**

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

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

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

Charadrius veredus Oriental Plover, Oriental Dotterel [882] Species or species habitat may occur within area

Glareola maldivarum Oriental Pratincole [840] Species or species habitat may occur within area

Haliaeetus leucogaster White-bellied Sea-Eagle [943] Species or species habitat likely to occur within area

Hirundo rustica Barn Swallow [662] Species or species habitat may occur within area

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

#### **Extra Information**

#### **State and Territory Reserves [ Resource Information ]**

Cane River, WA

#### **Invasive Species [ Resource Information ]**

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

Name Status Type of Presence

## **Mammals**

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

*Felis catus* Cat, House Cat, Domestic Cat [19] Species or species habitat likely to occur within area

*Oryctolagus cuniculus* Rabbit, European Rabbit [128] Species or species habitat likely to occur within area

*Vulpes vulpes* Red Fox, Fox [18] Species or species habitat likely to occur within area

## **Plants**

*Cenchrus ciliaris* Buffel-grass, Black Buffel-grass [20213] Species or species habitat likely to occur within area

*Parkinsonia aculeata* Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301] Species or species habitat may occur within area

*Prosopis* spp. Mesquite, Algaroba [68407] Species or species habitat likely to occur within area

*Salvinia molesta* Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665] Species or species habitat may occur within area

## **Caveat**

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report. This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions. Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources. For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps. For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge. Only selected species covered by the following provisions of the EPBC Act have been mapped: - migratory and- marine. The following species and ecological communities have

not been mapped and do not appear in reports produced from this database: - threatened species listed as extinct or considered as vagrants- some species and ecological communities that have only recently been listed- some terrestrial species that overfly the Commonwealth marine area- migratory species that are very widespread, vagrant, or only occur in small numbers. The following groups have been mapped, but may not cover the complete distribution of the species: - non-threatened seabirds which have only been mapped for recorded breeding sites; - seals which have only been mapped for breeding sites near the Australian continent. Such breeding sites may be important for the protection of the Commonwealth Marine environment.

### **Coordinates**

115.41222-22.20278

### **Acknowledgements**

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

- Department of Environment, Climate Change and Water, New South Wales
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Parks, Water and Environment, Tasmania
- Department of Environment and Natural Resources, South Australia
- Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
- Environmental and Resource Management, Queensland
- Department of Environment and Conservation, Western Australia
- Department of the Environment, Climate Change, Energy and Water
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Museum Victoria
- Australian Museum
- SA Museum
- Queensland Museum
- Online Zoological Collections of Australian Museums

- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Atherton and Canberra
- University of New England
- Ocean Biogeographic Information System
- Australian Government, Department of Defence
- State Forests of NSW
- Other groups and individuals

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

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

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## Appendix B – Conservation Codes and Definitions

Conservation Code	Category Description
T	<b>Threatened Flora (Declared Rare Flora – Extant)</b> “Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.”
X	<b>Presumed Extinct Flora (Declared Rare Flora – Extinct)</b> “Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.”
P1	<b>Priority One – Poorly-known Species</b> “Species that are known from one or a few collections or sight records (generally <5) all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mine leases and areas under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.”
P2	<b>Priority Two – Poorly-known Species</b> “Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.”
P3	<b>Priority Three – Poorly-known Species</b> “Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.”
P4	<b>Priority Four - Rare, Near Threatened and other species in need of monitoring</b> “Rare – Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. Near Threatened - Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.”
P5	<b>Priority Five – Conservation Dependent Species</b> “Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.”

## Appendix C – DEC Database Search Results

NatureMap Species Report

*Created By Guest user on 19/06/2011*

Kingdom: Current Names Only

Species Group Data Source

Method: Centre

Buffer Group By: Plantae

Banksia Atlas or Banded Iron Formation and Greenstone survey data or Declared Endangered Flora Database or The Orchid Atlas of Western Australia or Ravensthorpe Range survey data or Salinity Action Plan Flora Survey Data or Swan Coastal Plain Survey or WA Herbarium Specimen Database

'By Circle': 115°24' 42" E, 22°12' 10" S

40km

### Family

Family	Species	Records
Aizoaceae	3	4
Amaranthaceae	17	37
Asteraceae	20	28
Boraginaceae	7	12
Brassicaceae	1	1
Bryaceae	1	1
Campanulaceae	1	2
Capparaceae	1	1
Caryophyllaceae	2	2
Caulerpaceae	1	1
Celastraceae	1	2
Chenopodiaceae	12	20
Cleomaceae	2	3



Convolvulaceae	6	9
Cucurbitaceae	1	2
Cyperaceae	9	16
Euphorbiaceae	5	11
Fabaceae	52	110
Gentianaceae	1	1
Goodeniaceae	10	21
Gyrostemonaceae	1	1
Haloragaceae	1	1
Lamiaceae	2	13
Malvaceae	31	49
Marsileaceae	1	1
Molluginaceae	1	6
Myrtaceae	11	36
Nyctaginaceae	2	3
Orobanchaceae	1	1
Phrymaceae	2	2
Phyllanthaceae	1	1
Plantaginaceae	2	5
Poaceae	31	48
Portulacaceae	2	6
Proteaceae	6	13
Pteridaceae	2	4
Rubiaceae	3	3
Scrophulariaceae	8	15
Solanaceae	5	12
Zygophyllaceae	4	6
TOTAL	270	510

## Species

### Aizoaceae

*Trianthema oxycalyptra* var. *oxycalyptra*

*Trianthema triquetra* (Red Spinach)

*Zaleya galericulata* subsp. *galericulata*

### Amaranthaceae

*Alternanthera nana* (Hairy Joyweed)

*Alternanthera nodiflora* (Common Joyweed)

*Alternanthera pungens* (Khaki Weed) Y

*Amaranthus cuspidifolius*

*Gomphrena affinis* subsp. *pilbarensis*

*Gomphrena cunninghamii*

*Ptilotus appendiculatus*

*Ptilotus appendiculatus* var. *appendiculatus*

*Ptilotus arthrolasius*

*Ptilotus astrolasius*

*Ptilotus axillaris* (Mat Mulla Mulla)

*Ptilotus fusiformis*

*Ptilotus helipteroides* (Hairy Mulla Mulla)

*Ptilotus incanus*

*Ptilotus latifolius* (Tangled Mulla Mulla)

*Ptilotus obovatus* (Cotton Bush)

*Ptilotus villosiflorus*

### Asteraceae

*Calocephalus beardii*

*Calocephalus knappii*

*Calocephalus multiflorus* (Yellow-top)

*Calotis plumulifera*  
*Calotis porphyroglossa*  
*Centipeda minima* (Spreading Sneezewood)  
*Conyza bonariensis* (Flaxleaf Fleabane) Y  
*Decazesia hecatocephala*  
*Helichrysum luteoalbum* (Jersey Cudweed)  
*Helichrysum oligochaetum* P1  
*Peripleura virgata*  
*Pluchea dentex*  
*Pluchea dunlopil*  
*Pluchea rubelliflora*  
*Pterocaulon sphacelatum* (Apple Bush)  
*Pterocaulon sphaeranthoides*  
*Rhodanthe psammophila*  
*Streptoglossa cylindriceps*  
*Streptoglossa decurrens*  
*Streptoglossa macrocephala*

#### Boraginaceae

*Heliotropium crispatum*  
*Heliotropium heteranthum*  
*Heliotropium inexplicitum*  
*Heliotropium ovalifolium*  
*Heliotropium pachyphyllum*  
*Heliotropium tenuifolium* (Mamukata)  
*Heliotropium transforme*

#### Brassicaceae

*Stenopetalum anfractum*

Bryaceae

*Bryum argenteum*

Campanulaceae

*Wahlenbergia tumidifruca*

Capparaceae

*Capparis spinosa* var. *nummularia* (Coastal Caper)

Caryophyllaceae

*Polycarpaea corymbosa*

*Polycarpaea holtzei*

Caulerpaceae

*Caulerpa corynephora*

Celastraceae

*Stackhousia intermedia*

Chenopodiaceae

*Atriplex codonocarpa* (Flat-topped Saltbush)

*Atriplex semilunaris* (Annual Saltbush)

*Dysphania kalpari* (Rat's Tail)

*Dysphania rhadinostachya*

*Dysphania rhadinostachya* subsp. *inflata*

*Dysphania rhadinostachya* subsp. *rhadinostachya*

*Enchylaena tomentosa* (Barrier Saltbush)

*Maireana melanocoma* (Pussy Bluebush)

*Maireana planifolia* (Low Bluebush)

*Sclerolaena costata*

*Sclerolaena densiflora*

*Sclerolaena gardneri*

Cleomaceae

*Cleome uncifera* subsp. *uncifera*

*Cleome viscosa* (Tickweed)

Convolvulaceae

*Bonamia alatisemina*

*Bonamia linearis*

*Evolvulus alsinoides* var. *villosicalyx*

*Ipomoea muelleri* (Poison Morning Glory)

*Polymeria ambigua* (Morning Glory)

*Polymeria lanata*

Cucurbitaceae

*Cucumis maderaspatanus*

Cyperaceae

*Bulbostylis barbata*

*Cyperus cunninghamii*

*Cyperus cunninghamii* subsp. *cunninghamii*

*Cyperus dactylotes*

*Cyperus iria*

*Cyperus rigidellus*

*Cyperus squarrosus*

*Cyperus vaginatus* (Stiffleaf Sedge)

*Schoenoplectus subulatus*

Euphorbiaceae

*Adriana tomentosa* var. *tomentosa*

*Euphorbia australis* (Namana)

*Euphorbia boophthona* (Gascoyne Spurge)

*Euphorbia drummondii* (Caustic Weed)

*Euphorbia myrtoides*

Fabaceae

*Acacia ancistrocarpa* (Fitzroy Wattle)

*Acacia aptaneura*

*Acacia arida*

*Acacia atkinsiana*

*Acacia bivenosa*

*Acacia citrinoviridis*

*Acacia pyrifolia* var. *morrisonii*

*Acacia sclerosperma* subsp. *sclerosperma*

*Acacia sericophylla*

*Acacia sphaerostachya*

*Acacia stellaticeps*

*Acacia synchronicia*

*Acacia tetragonophylla* (Kurara)

*Acacia trachycarpa* (Minni Ritchi)

*Acacia trudgeniana*

*Acacia tumida* var. *pilbarensis*

*Acacia wanyu*

*Acacia xiphophylla*

*Aenictophyton reconditum*

*Cajanus cinereus*  
*Crotalaria medicaginea*  
*Crotalaria ramosissima*  
*Cullen lachnostachys*  
*Cullen leucanthum*  
*Cullen leucochaites*  
*Cullen martinii*  
*Cullen pogonocarpum*  
*Glycine canescens* (Silky Glycine)  
*Indigofera boviparda*  
*Indigofera georgei* (Bovine Indigo)  
*Indigofera monophylla*  
*Isotropis atropurpurea* (Poison Sage)  
*Labichea cassioides*  
*Lotus cruentus* (Redflower Lotus)  
*Petalostylis cassioides*  
*Petalostylis labicheoides* (Slender Petalostylis)  
*Rhynchosia australis* (Rhynchosia)  
*Senna artemisioides* subsp. *oligophylla*  
*Senna ferraria*  
*Senna glutinosa* subsp. *glutinosa*  
*Senna glutinosa* subsp. *pruinosa*  
*Senna notabilis*  
*Senna venusta*  
*Sesbania cannabina* (Sesbania Pea)  
*Swainsona forrestii*  
*Swainsona pterostylis*  
*Tephrosia clementii*  
*Tephrosia coriacea*

*Tephrosia gardneri*

*Tephrosia rosea* (Flinders River Poison)

*Tephrosia uniovulata*

*Vachellia farnesiana* (Mimosa Bush) Y

Gentianaceae

*Centaurium clementii*

Goodeniaceae

*Dampiera candidans*

*Goodenia forrestii*

*Goodenia microptera*

*Goodenia stobbsiana*

*Goodenia tenuiloba*

*Scaevola acacioides*

*Scaevola parvifolia* subsp. *pilbarae*

*Scaevola pulchella*

*Scaevola sericophylla*

*Scaevola spinescens* (Currant Bush)

Gyrostemonaceae

*Gyrostemon ramulosus* (Corkybark)

Haloragaceae

*Haloragis gossei*

Lamiaceae

*Pityrodia loxocarpa*

*Pityrodia paniculata*



Malvaceae

*Abutilon lepidum*

*Abutilon oxycarpum* (Flannel Weed)

*Abutilon trudgenii*

*Corchorus crozophorifolius*

*Corchorus laniflorus*

*Corchorus parviflorus*

*Corchorus sidoides* subsp. *vermicularis*

*Gossypium australe* (Native Cotton)

*Hibiscus burtonii*

*Hibiscus coatesii*

*Hibiscus goldsworthii*

*Hibiscus leptocladus*

*Hibiscus sturtii* (Sturt's Hibiscus)

*Hibiscus sturtii* var. *campylochlamys*

*Malvastrum americanum* (Spiked Malvastrum) Y

*Sida arsinata*

*Sida echinocarpa*

*Sida intricata* (Tangled Sida)

*Sida platycalyx* (Lifesaver Burr)

*Sida rohlena* subsp. *rohlena*

*Sida* sp. Articulation below (A.A. Mitchell PRP 1605)

*Sida* sp. Pilbara (A.A. Mitchell PRP 1543)

*Sida* sp. verrucose glands (F.H. Mollemans 2423)

*Triumfetta chaetocarpa* (Urchins)

*Triumfetta clementii*

*Triumfetta echinata* P3

*Triumfetta johnstonii*

*Triumfetta maconochieana*

*Triumfetta ramosa*

*Waltheria indica*

*Waltheria virgata*

Marsileaceae

*Marsilea hirsuta* (Nardoo)

Molluginaceae

*Mollugo molluginea*

Myrtaceae

*Calytrix truncatifolia*

*Corymbia candida*

*Corymbia candida* subsp. *candida*

*Corymbia deserticola* subsp. *deserticola*

*Corymbia hamersleyana*

*Corymbia opaca*

*Corymbia zygophylla*

*Eucalyptus camaldulensis* subsp. *obtusa* (Blunt-budded River Red Gum)

*Eucalyptus victrix*

*Eucalyptus xerothermica*

*Verticordia forrestii* (Forrest's Featherflower)

Nyctaginaceae

*Boerhavia coccinea* (Tar Vine)

*Boerhavia schomburgkiana*

Orobanchaceae

*Striga curviflora*

Phrymaceae

*Peplidium aithocheilum*

*Peplidium muelleri*

Phyllanthaceae

*Notoleptopus decaisnei*

Plantaginaceae

*Stemodia grossa* (Marsh Stemodia)

*Stemodia* sp. Onslow (A.A. Mitchell 76/148)

Poaceae

*Brachyachne prostrata*

*Cenchrus ciliaris* (Buffel Grass) Y

*Chrysopogon fallax* (Golden Beard Grass)

*Cymbopogon ambiguus* (Scentgrass)

*Cymbopogon obtectus* (Silkyheads)

*Dactyloctenium radulans* (Button Grass)

*Dichanthium fecundum* (Curly Bluegrass)

*Dichanthium sericeum* (Queensland Blue Grass)

*Dichanthium sericeum* subsp. *humilius*

*Enneapogon caerulescens* (Limestone Grass)

*Eragrostis cumingii* (Cuming's Love Grass)

*Eragrostis dielsii* (Mallee Lovegrass)

*Eragrostis eriopoda* (Woollybutt Grass)

*Eragrostis tenellula* (Delicate Lovegrass)

*Eriachne benthamii* (Swamp Wanderrie)

*Eriachne gardneri*  
*Eriachne mucronata* (Mountain Wanderrie Grass)  
*Eriachne pulchella* (Pretty Wanderrie)  
*Eriachne pulchella* subsp. *dominii*  
*Eriachne pulchella* subsp. *pulchella*  
*Eulalia aurea*  
*Paraneurachne muelleri* (Northern Mulga Grass)  
*Paspalidium clementii* (Clements Paspalidium)  
*Sporobolus australasicus* (Fairy Grass)  
*Triodia basedowii* (Lobed Spinifex)  
*Triodia epactia*  
*Triodia lanigera*  
*Triodia longiceps* (Giant Grey Spinifex)  
*Triodia pungens* (Soft Spinifex)  
*Triodia schinzii*  
*Yakirra australiensis* var. *australiensis*

#### Portulacaceae

*Portulaca oleracea* (Purslane) Y  
*Portulaca pilosa* (Djanggara)

#### Proteaceae

*Grevillea berryana*  
*Grevillea eriostachya* (Flame Grevillea)  
*Grevillea stenobotrya*  
*Grevillea wickhamii* (Wickham's Grevillea)  
*Grevillea wickhamii* subsp. *aprica*  
*Grevillea wickhamii* subsp. *macrodonga*

Pteridaceae

*Cheilanthes contigua*

*Cheilanthes sieberi* subsp. *sieberi*

Rubiaceae

*Oldenlandia crouchiana*

*Synaptantha tillaeacea*

*Synaptantha tillaeacea* var. *tillaeacea*

Scrophulariaceae

*Eremophila cuneifolia* (Pinyuru)

*Eremophila forrestii* subsp. *forrestii*

*Eremophila fraseri* (Burra)

*Eremophila fraseri* subsp. *fraseri*

*Eremophila latrobei* subsp. *latrobei*

*Eremophila longifolia* (Berrigan)

*Eremophila maculata* subsp. *brevifolia* (Native Fuchsia)

*Eremophila strongylophylla*

Solanaceae

*Nicotiana benthamiana* (Tjuntiwari)

*Solanum diversiflorum*

*Solanum ellipticum* (Potato Bush)

*Solanum horridum*

*Solanum sturtianum* (Thargomindah Nightshade)

Zygophyllaceae

*Tribulus astrocarpus*

*Tribulus hirsutus*

*Tribulus macrocarpus*

*Tribulus suberosus*

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 wholly 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 – List of Flora Found During Reconnaissance Survey

### Flora Species found over Turtle and Range Resources

#### Lauraceae 80

*Cassytha filiformis*

#### Poaceae 163

*Aristida latifolia*

\**Cenchrus ciliaris*

*Enneapogon caerulescens*

*Eragrostis dielsii*

*Eragrostis eriopoda*

*Triodia basedowii*

*Triodia lanigera*

*Triodia wiseana*

#### Proteaceae 175

*Grevillea wickhamii* subsp. *hispidula*

*Hakea lorea* subsp. *lorea*

#### Zygophyllaceae 199

*Tribulus macrocarpus*

*Tribulus occidentalis*

*Tribulus* sp.

#### Fabaceae 201

*Acacia ancistrocarpa*

*Acacia bivenosa*

*Acacia inaequilatera*

*Acacia pyrifolia* subsp. *pyrifolia*

*Acacia stellaticeps*

*Acacia trachycarpa*

*Acacia xiphophylla*

*Cullen leucochaites*

*Senna artemisioides* subsp. *helmsii*

*Senna artemisioides* subsp. *oligophylla*

*Senna glutinosa* subsp. *glutinosa*

*Senna glutinosa* subsp. *pruinosa*

*Senna venusta*

*Sesbania cannabina*

\**Vachellia farnesiana*

#### Euphorbiaceae 242

*Euphorbia australis*

#### Myrtaceae 281

*Corymbia zygophylla*

#### Malvaceae 309

*Abutilon* sp.

*Sida echinocarpa*

*Sida rohlenae* subsp. *rohlenae*

*Triumfetta chaetocarpa*

#### Gyrostemonaceae 328

*Codonocarpus cotinifolius*

*Goodenia forrestii*

**Cleomaceae 331**

*Cleome viscosa*

**Amaranthaceae 357**

*Ptilotus astrolasius*

*Ptilotus axillaris*

*Ptilotus clementii*

*Ptilotus exaltatus*

*Ptilotus obovatus* var. *obovatus*

**Chenopodiaceae 358**

*Dysphania plantaginella*

**Portulacaceae 374**

\**Portulaca oleracea*

**Boraginaceae 415**

*Heliotropium ammophilum*

**Convolvulaceae 416**

*Bonamia rosea*

**Solanaceae 417**

*Solanum diversifolium*

*Solanum lasiophyllum*

**Goodeniaceae 458**